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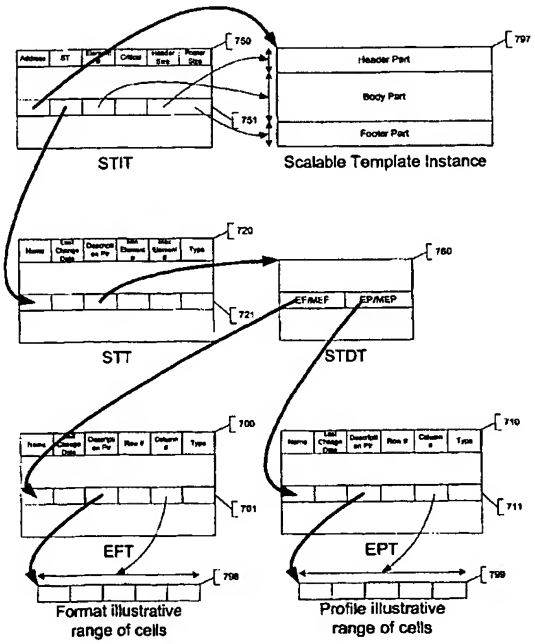
(54) Title: SYSTEM AND METHOD IN A SPREADSHEET FOR EXPORTING-IMPORTING THE CONTENT OF INPUT CELLS FROM A SCALABLE TEMPLATE INSTANCE TO ANOTHER



(57) Abstract: The present invention is directed to a method, system and program for exporting-importing the content of input cells from a source scalable template instance in a source multi-dimensional spreadsheet to a destination scalable template instance in a destination multi-dimensional spreadsheet; a multi-dimensional spreadsheet comprising a plurality of cells identified by a cell address along each dimension; a scalable template instance comprising a variable number of contiguous elements of same size ordered and aligned along a given spreadsheet dimension and structured according to information defined in an associated scalable template; an element being defined as a range of cells; a range of cells comprising one or a plurality of cells; said scalable template comprising an element profile; an element profile defining a cell content and a cell destination for each cell within each element; said cell destination specifying whether the cell is an input cell for receiving an entry or an output cell for producing a result. The method comprises the steps of: detecting a command for exporting-importing input cells from a source scalable template instance in a source spreadsheet to a destination scalable template instance in a destination spreadsheet; identifying the source scalable template associated with the source scalable template instance; identifying cells, if there are any, defined as input cells in the element profile of the source scalable template; identifying the destination scalable template associated with the destination scalable template instance; Identifying cells, if there are any, defined as input cells in the element profile of the destination scalable template; copying cell per cell, the content of each input cell of the source scalable 36 template instance in each input cell of the destination scalable template instance.

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SYSTEM AND METHOD IN A SPREADSHEET FOR EXPORTING-IMPORTING THE CONTENT OF INPUT CELLS FROM A SCALABLE TEMPLATE INSTANCE TO ANOTHER

Technical field of the invention

The present invention relates to the field of information processing by digital computers, more particularly to a method and system for exporting-importing the content of input cells from a source scalable template instance in a source multi-dimensional spreadsheet to a destination scalable template instance in a destination multi-dimensional spreadsheet; a multi-dimensional spreadsheet comprising a plurality of cells identified by a cell address along each dimension, a scalable template instance comprising a variable number of contiguous elements of same size ordered and aligned along a given spreadsheet dimension and structured according to information defined in an associated scalable template.

Background art

Before computers, numerical analyses, particularly financial ones, were usually prepared on an accountant's columnar pad or spreadsheet, with pencil and calculator in hand. By organizing data into columns and rows, spreadsheets afford the rapid assimilation of information by a reader. The task of preparing a spreadsheet on paper, however, is not quite so fast. Instead, the process tends to be very slow, as each entry must be tediously calculated and entered into the spreadsheet. Since all calculations are the responsibility of the preparer, manually prepared spreadsheets are also prone to errors. Hence, preparation of spreadsheets by hand is slow, tedious, and unreliable.

With the advent of microcomputers, a solution was forthcoming in the form of "electronic spreadsheets." Better known simply as "spreadsheets," these software programs provide a computerized replacement for the traditional financial modelling tools: the accountant's columnar pad, pencil, and calculator. In some regards, spreadsheet programs are to those tools what word processors are to typewriters.

Spreadsheets offer dramatic improvements in ease of creating, editing, and using financial models.

A typical spreadsheet program configures the memory of a computer to resemble the column/row or grid format of an accountant's columnar pad, thus providing a visible calculator for a user. Because this "pad" exists dynamically in the computer's memory, however, it differs from paper pads in several important ways. Locations in the electronic spreadsheet, for example, must be communicated to the computer in a format which it can understand. A common scheme for accomplishing this is to assign a number to each row in a spreadsheet, and a letter to each column. To reference a location at column A and row 1 (i.e., the upper-left hand corner), for example, the user types in "A1". In this manner, the spreadsheet defines an addressable storage location or "cell" at each intersection of a row with a column.

Data entry into an electronic spreadsheet occurs in much the same manner that information would be entered on an accountant's pad. After a screen cursor is positioned at a desired location, the user can enter alphanumeric information. Besides holding text and numeric information, however, spreadsheet cells can store special instructions or "formulas" specifying calculations to be performed on the numbers stored in spreadsheet cells. In this fashion, cell references can serve as variables in an equation, thereby allowing precise mathematical relationships to be defined between cells. The structure and operation of a spreadsheet program, including advanced functions such as functions and macros, are documented in the technical, trade, and patent literature. For an overview, see e.g., Cobb, *S., Using Quattro Pro* 2, Borland-OsbomelMcGraw-Mll, 1990; and LeBlond, G. and Cobb, D., *Using* 1-2-3, Que corp., 1985. The disclosures of each of the foregoing are hereby incorporated by reference.

Electronic spreadsheets offer many advantages over their paper counterparts. For one, electronic spreadsheets are much larger (i.e., hold more information) than their paper counterparts; electronic spreadsheets having thousands or even millions of cells are not uncommon. Spreadsheet programs also allow users to perfom "what-if" scenarios. After a set of computational relationships has been entered into

a worksheet, thanks to imbedded formulas and/or built-in functions for instance, the spread of information can be recalculated using different sets of assumptions, with the results of each recalculation appearing almost instantaneously. Performing this operation manually, with paper and pencil, would require recalculating every relationship in the model with each change made. Thus, electronic spreadsheet systems were invented to solve "what-if' problems, that is, changing an input and seeing what happens to an output.

As exposed above, one essential value of an electronic spreadsheet is to organize data into columns and rows, while automating tedious calculations. A typical, common, and valuable example of such a set of data organized into columns and rows is a range of cells. Even if a range of cells receives a formal and strict definition within electronic spreadsheet environments, it is flexible enough so that information can be included in either a single range of cells or in a set of several ranges of cells. Ranges of cells therefore are quite useful objects. A range of cell can be defined and processed as a whole entity. For example it can be copied from one place to another place within the spreadsheet or from one spreadsheet file to another spreadsheet file.

Ranges of cells are widely used in applications developed in the field of electronic spreadsheets. Most often, the ranges of cells are arranged according to some kind of structure, thus becoming structured ranges of cells. The contents of each cell is defined within an element, where an element is defined as a row of a structured range of cells, and then the same kind of element is repeated a certain number of times, to store/process a variable number of information pieces. Most of the time, several instances of similar structured ranges of cells are used. In the current context where no other tool is really available, instances of such similar structured ranges of cells are frequently created through cut/copy and paste operations.

Creating a new instance of a structured range of cells is complex and lengthy, particularly because a conventional range of cells shows strong limitations :

- (i) structure information (such as number of columns, number of rows), format information (such as font style, color or border), and contents information (such as formulas or raw - or informative - data) are mixed,
- (ii) the size of the range of cell is fixed at a given instant.

Therefore, when a spreadsheet user wants to create another range of cells with an identical structure, he/she needs to perform successively several operations. He/she needs to :

1. copy-paste an existing structured range of cells,
2. distinguish between areas containing raw - or informative - data and areas containing generic content such as formulas,
3. empty the copied structured range of cells of the copied raw data while trying to keep the structure, format and generic contents,
4. adjust the size of the structured copied range of cells to his new needs.
5. eventually, fill the raw data area with default values, in order to ease subsequent data entry.

Furthermore, before copying and pasting a structured range of cells, the user must prepare the place for the copied structured range of cells, with the risk of overwriting, and therefore loosing the preexisting information at the destination location. This chain of operations rapidly becomes tedious, lengthy and prone to error, especially when manipulated structured ranges of cells increase in size and complexity.

Updating a structured range of cells is also very often complex, lengthy and prone to error. Such updates include additions of new elements and modifications of existing elements. Several types of modifications can be performed without any specific problem in an electronic spreadsheet environment. However, this is not the case for some modifications, for instance for insertions.

For example, if a row is added by means of a conventional function such as the spreadsheet row insertion method, the created row will be empty. This means that the value for every cell of every element needs to be entered. Entering data or

executing copy/paste operations represents an important workload for the user, while the content of each element is known to a certain extent, and should follow the general structure of the structured range of cells. Moreover, normal spreadsheet functions such as the row insertion function may jeopardize the contents of some neighbour elements. A good exemple of an insertion jeopardising neighbour elements is the insertion of a row in a range of cells in which, on every row, a cell such as C17 or more generally (Cn), is pointing to a cell in the previous row, through a formula such as C16+B17, or more generally (Cn-1)+(Bn). After row insertion between rows 16 and 17, the formula in cell C18 becomes C16+B18 instead of the generic formula C17+B18, or more generally after row insertion between rows (n-1) and (n), the formula in cell (Cn+1) becomes (Cn-1)+(Bn+1) instead of the generic formula (Cn)+(Bn+1).

As a second exemple, there are cases where modifications must be done consistently throughout the structured range of cells. Today, this can only be done using specific copy-paste operations applied to the exact area to be modified. This may prove to be very difficult, especially when manipulated structured ranges of cells increase in size and complexity.

Deleting an element of a structured range of cells is an operation prone to error. As a matter of fact, normal spreadsheet functions such as the row deletion function may jeopardize the contents of some neighbour elements, leading to unresolved references (#REF results) or, even worse to wrong formulas that may be difficult to identify. Solving this problem requires additional "context intelligence", taking into account the structure of the structured range of cells in which the element deletion occurs. Another need appears at the time the user invokes the conventional Delete function after selection in the spreadsheet of one or a plurality of cells. If the selection belongs to a structured range of cells, calling the Delete function by means of a menu or by pressing the "Delete" key, leaves room to ambiguity as to what the user wants to perform. Removing this ambiguity can only be done today by selecting the exact area to be deleted, which may prove to be very difficult, especially as manipulated structured ranges of cells increase in size and complexity. Solving this problem requires additional "context intelligence" to detect this situation, take

advantage of the structure of the structured range of cells and offer the relevant choice to the user.

The amount of storage that is necessary to save a structured range of cells may become prohibitive when such a structured range of cells grows in size. On another hand, an important portion of each element of such a structured range of cells may be constituted of OUT fields containing formulas, without any user provided data. Those fields are similar from element to element, and comprise redundant information. This information is not redundant from an end user standpoint, since it is certainly useful, but is redundant because it can be recreated from the base structure of the structured range of cells. Storing and/or conveying this redundant information is a waste that could be avoided if a mechanism would allow to only store/convey the informative data and the information related to the base structure of the structured range of cells.

Sorting data within a selected range of cells introduces the risk of jeopardising any neighbouring structured range of cells. This risk exists because the selected range of cells is sorted, regardless of the existence of any neighbouring structured range of cells and regardless of the respective positions of the selected range of cells versus any neighbouring structured range of cells. The risk can be avoided only by a careful and precise selection of the range to sort. This selection is prone to error, especially when structured ranges of cells grow in size and complexity. Improved control over sort operations are possible by taking into account the structure and the position of the structured ranges of cells.

The United States Patent 5,033,009 is an interesting piece of prior art, that develops the concepts of pattern data and variable data that may be integrated to generate a worksheet file through a worksheet file generator.

This invention however shows many limitations preventing it from solving the set of issues presented here above and, in particular :

- It aims at producing a new output spreadsheet from a set of two input files, while there is a need, within a user application environment, to create and manipulate

new entities within an existing electronic spreadsheet file, that the user is familiar with.

- It contains no mechanism allowing the direct update of the output spreadsheet, other than the regular spreadsheet tool.
- It contains no capability to manipulate within the same spreadsheet file, a variable number of different structures and a variable number of instances of each of those structure. The granularity is limited to the spreadsheet file, while the required granularity is that of a structured range of cells.
- The so called "file format specification" really mixes structure information (such as number and relative position of columns and rows), presentation information (such as font, color, background, etc.), contents information (such as formulas, etc.).

Summary of the invention

As defined in independent claims, the present invention is directed to a method, system and program for exporting-importing the content of input cells from a source scalable template instance in a source multi-dimensional spreadsheet to a destination scalable template instance in a destination multi-dimensional spreadsheet; a multi-dimensional spreadsheet comprising a plurality of cells identified by a cell address along each dimension; a scalable template instance comprising a variable number of contiguous elements of same size ordered and aligned along a given spreadsheet dimension and structured according to information defined in an associated scalable template; an element being defined as a range of cells; a range of cells comprising one or a plurality of cells; said scalable template comprising an element profile; an element profile defining a cell content and a cell destination for each cell within each element; said cell destination specifying whether the cell is an input cell for receiving an entry or an output cell for producing a result.

The method comprises the steps of:

- Detecting a command for exporting-importing input cells from a source scalable template instance in a source spreadsheet to a destination scalable template instance in a destination spreadsheet;
- Identifying the source scalable template associated with the source scalable template instance;
- Identifying cells, if there are any, defined as input cells in the element profile of the source scalable template;
- Identifying the destination scalable template associated with the destination scalable template instance;
- Identifying cells, if there are any, defined as input cells in the element profile of the destination scalable template;
- Copying cell per cell, the content of each input cell of the source scalable template instance in each input cell of the destination scalable template instance.

Further embodiments of the invention are provided in the appended dependent claims.

The foregoing, together with other objects, features, and advantages of this invention can be better appreciated with reference to the following specification, claims and drawings.

Brief description of the drawings

The novel and inventive features believed characteristics of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative detailed embodiment when read in conjunction with the accompanying drawings, wherein :

- Figure **1A** is a schematic view of a computer system in which the present invention may be embodied.

- Figure **1B** is a schematic view of a software system including an operating system, an application software, and a user interface for carrying out the present invention.

- Figure **1C** illustrates the basic architecture and functionality of a graphical user interface in which the present invention may be embodied.

- Figure **2A** shows a spreadsheet notebook interface according to the preferred embodiment of the present invention.

- Figure **2B** shows the toolbar component of the notebook interface shown in Figure **2A**.

- Figures **2C** and **2D** show page identifiers for rapidly accessing and manipulating individual pages of the notebook interface shown in Figure **2A**.

- Figure **3** illustrates the concepts of formats, profiles, and scalable templates, according to the preferred embodiment of the present invention.

- Figures **4A** and **4B** illustrate the concepts of scalable template instances, according to the preferred embodiment of the present invention.

- Figure **5** provides a structured organisational view of the concepts of formats, profiles, scalable templates, and scalable template instances according to the preferred embodiment of the present invention.

- Figures **6A, 6B, 6C** and **6D** show a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, respectively for managing scalable templates, for editing formats, for editing profiles and for editing scalable templates.

- Figures **7A, 7B, 7C, 7D, 7E, 7F, 7G** and **7H** respectively illustrate the structure of the Element Format Table (EFT), of the Element Profile Table (EPT), of the

Scalable Template Table (STT), of the Scalable Template Manager Table (STMT), of a Scalable Template Descriptor Table (STDT), of the Scalable Template Instance Table (STIT), of a Scalable Template Export-Import Table (STEIT), and of the Scalable Template Instance Export-Import Table (STIEIT) according to the preferred embodiment of the present invention.

- Figure **7I** gives a graphical illustration of the relationships established between the tables EFT, EPT, STT, STDT, and STIT according to the preferred embodiment of the present invention.

- Figure **8** is a flow chart illustrating a preferred method for managing scalable template objects according to a preferred embodiment of the present invention.

- Figure **9** is a flow chart illustrating a preferred method for editing element formats and meta-element formats according to a preferred embodiment of the present invention.

- Figure **10** is a flow chart illustrating a preferred method for editing element profiles and meta-element profiles according to a preferred embodiment of the present invention.

- Figures **11A**, **11B**, **11C**, **11D**, **11E**, **11F**, **11G**, **11H**, **11I** and **11J** illustrate the limitations of conventional means available in conventional electronic spreadsheet environments for managing structured ranges of cells.

- Figures **12** is a flow chart illustrating a preferred method for editing a scalable template according to a preferred embodiment of the present invention.

- Figure **13A** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for creating scalable template instances.

- Figures **13B**, **13C**, **13D**, **13E**, **13F** and **13G** illustrate the different modes of scalable template instanciation, according to a preferred embodiment of the present invention.

- Figure **14** is a flow chart illustrating a preferred method for creating scalable template instances according to a preferred embodiment of the present invention.

- Figure **15** is a flow chart illustrating a preferred method for managing insertion in scalable template instances according to a preferred embodiment of the present invention.

- Figures **16A**, and **16B** show each a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for managing insertion in scalable template instances.

- Figures **17A**, **17B**, **17C**, **17D**, **17E**, **17F**, **17G** and **17H** illustrate the different modes of scalable template instance insertion, according to a preferred embodiment of the present invention.

- Figure **18** is a flow chart illustrating a preferred method for managing deletion in scalable template instances according to a preferred embodiment of the present invention.

- Figures **19A**, and **19B** show each a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for managing deletion in scalable template instances.

- Figures **20A**, **20B**, **20C**, **20D**, and **20E** illustrate the different modes of scalable template instance deletion, according to a preferred embodiment of the present invention.

- Figure **21** is a flow chart illustrating a preferred method for refreshing scalable template instances according to a preferred embodiment of the present invention.

- Figures **22A**, and **22B** show each a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for refreshing scalable template instances.

- Figure **23A** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for copying scalable template instances.

- Figure **23B** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for cutting scalable template instances.

- Figure **23C** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for pasting scalable template instances.

- Figure **24A** is a flow chart illustrating a preferred method for copying scalable template instances according to a preferred embodiment of the present invention.

- Figure **24B** is a flow chart illustrating a preferred method for cutting scalable template instances according to a preferred embodiment of the present invention.

- Figure **24C** is a flow chart illustrating a preferred method for pasting scalable template instances according to a preferred embodiment of the present invention.

- Figure **25A** is a flow chart illustrating a preferred method for exporting scalable template items (element formats, or meta-element formats, or element profiles, or meta-element profiles, or scalable templates) according to a preferred embodiment of the present invention.

- Figure **25B** is a flow chart illustrating a preferred method for importing scalable template items (element formats, or meta-element formats, or element profiles, or meta-element profiles, or scalable templates) according to a preferred embodiment of the present invention.

- Figure **26A** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for exporting scalable template items (element formats, or meta-element formats, or element profiles, or meta-element profiles, or scalable templates).

- Figure **26B** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for importing scalable template items (element formats, or meta-element formats, or element profiles, or meta-element profiles, or scalable templates).

- Figures **26C** illustrates the logical file structure of the export-import files, according to the preferred embodiment of the present invention.

- Figure **27A** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for exporting scalable template instances.

- Figure **27B** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for importing scalable template instances.

- Figure **27C** illustrates the structure of the Exported Scalable Template Instance Table (ESTIT) according to a preferred embodiment of the present invention.

- Figure **28A** is a flow chart illustrating a preferred method for exporting scalable template instances according to a preferred embodiment of the present invention.

- Figure **28B** is a flow chart illustrating a preferred method for importing scalable template instances according to a preferred embodiment of the present invention.

- Figure **29A** is a flow chart illustrating a preferred method for sorting scalable template instances according to a preferred embodiment of the present invention.

- Figure **29B** shows a preferred spreadsheet user interface, according to the preferred embodiment of the present invention, for sorting scalable template instances.

Detailed description of the preferred embodiment

SYSTEM HARDWARE

As shown in FIG. **1A**, the present invention may be embodied on a computer system **100** comprising a central processor **101**, a main memory **102,** an input/output controller **103,** a keyboard **104,** a pointing device **105** (e.g., mouse, track ball, pen device, or the like), a display device **106,** and a mass storage **107** (e.g., hard disk). Additional input/output devices, such as a printing device **108,** may be included in the system **100** as desired. As illustrated, the various components of the system **100** communicate through a system bus **110** or similar architecture. In a preferred embodiment, the computer system **100** includes an IBM-compatible personal computer, which is available from several vendors (including International Business Machine - IBM Corporation of Armonk, N.Y.).

Illustrated in FIG. **1B**, a computer software system **150** is provided for directing the operation of the computer system **100**. Software system **150,** which is stored in system memory **102** and on disk memory **107,** includes a kernel or operating system **151** and a shell or interface **153.** One or more application programs, such as application software **152,** may be "loaded' (i.e., transferred from storage **107** into memory **102)** for execution by the system **100.** The system **100** receives user commands and data through user interface **153;** these inputs may then be acted upon by the system **100** in accordance with instructions from operating module **151** and/or application module **152.** The interface **153,** which is preferably a graphical user interface (GUI), also serves to display results, whereupon the user may supply additional inputs or terminate the session. In a preferred embodiment, operating system **151** and interface **153** are Microsoft Win95, available from Microsoft Corporation of Redmond, Wash. Application module **152,** on the other hand, includes a spreadsheet notebook of the present invention as described in further detail herein below.

INTERFACE

A. Introduction

The following description will focus on the presently preferred embodiments of the present invention, which are embodied in spreadsheet applications operative in the Microsoft Win95 environment. The present invention, however, is not limited to any particular application or any particular environment. Instead, those skilled in the art will find that the system and methods of the present invention may be advantageously applied to a variety of system and application software, including database management systems, word processors, and the like. Moreover, the present invention may be embodied on a variety of different platforms, including Macintosh, UNIX, NextStep, and the like. Therefore, the description of the exemplary embodiments which follows is for purposes of illustration and not limitation.

Referring now to FIG. **1C**, the system **100** includes a windowing interface or workspace **160**. Window **160** is a rectangular, graphical user interface (GUI) for display on screen **106**; additional windowing elements may be displayed in various sizes and formats (e.g., tiled or cascaded), as desired. At the top of window **160** is a menu bar **170** with a plurality of user-command choices, each of which may invoke additional submenus and software tools for use with application objects. Window **160** includes a client area **180** for displaying and manipulating screen objects, such as graphic object **181** and text object **182**. In essence, the client area is a workspace or viewport for the user to interact with data objects which reside within the computer system **100**.

Windowing interface **160** includes a screen cursor or pointer **185** for selecting and otherwise invoking screen objects of interest. In response to user movement signals from the pointing device **105**, the cursor **185** floats (i.e., freely moves) across the screen **106** to a desired screen location. During or after cursor movement, the user may generate user-event signals (e.g., mouse button "clicks" and "drags") for selecting and manipulating objects, as is known in the art. For example, Window **160** may be closed, re-sized, or scrolled by "clicking" (selecting) screen components **172**, **174/5**, and **177/8**, respectively.

In a preferred embodiment, screen cursor **185** is controlled with a mouse device. Single-button, double-button, or triple-button mouse devices are available from a variety of vendors, including Apple Computer of Cupertino, Calif., Microsoft Corporation of Redmond, Wash., and Logitech Corporation of Fremont, Calif., respectively. More preferably, screen cursor control device **105** is a two-button mouse device, including both right and left "mouse buttons."

Programming techniques and operations for mouse devices are well documented in the programming and hardware literature; see e.g., *Microsoft Mouse Programmer's Reference,* Microsoft Press, 1989. The general construction and operation of a GUI event-driven system, such as Windows, is also known in the art: see, e.g., Petzold, C., *Programming Windows,* Second Edition, Microsoft Press, 1990. The disclosures of each are hereby incorporated by reference.

B. Preferred interface

Shown in FIG. **2A**, a spreadsheet notebook interface of the present invention will now be described The spreadsheet notebook or workbook of the present invention includes a notebook workspace **200** for receiving, processing, and presenting information, including alphanumeric as well as graphic information. Notebook workspace **200** includes a menu bar **210**, a toolbar **220**, a current cell indicator **230**, an input line **231**, a status line **240**, and a notebook window **250**. The menu bar **210** displays and invokes, in response to user inputs, a main level of user commands. Menu **210** also invokes additional pull down menus, as is known in windowing applications. Input line **231** accepts user commands and information for the entry and editing of cell contents, which may include data, formulas, macros, and the like. Indicator **230** displays an address for the current cursor (i.e., active cell) position, or the address or name of a selected named range (i.e. active selection). At the status line **240**, system **100** displays information about the current state of the workbook; for example, a "READY" indicator means that the system is ready for the user to select another task to be performed.

The toolbar **220**, shown in further detail in FIG. **2B**, comprises a row or palette of tools which provide a quick way for the user to choose commonly-used menu commands or properties. In an exemplary embodiment, toolbar **220** includes file manipulation buttons **221**, printing buttons **222**, an undo button **223**, cut, copy, and paste buttons **224**, information pop-up window buttons tool **225**, a named range selection button **226**, a style copy button **227**, a column re-sizing button **228**, and a sum button **229**. The functions of these buttons are suggested by their names. For instance, buttons **224** cut, copy and paste data and objects to and from Windows' clipboard. The same actions are also available as corresponding commands in the Edit menu (available from menu bar **210**).

The notebook, which provides an interface for entering and displaying information of interest, includes a plurality of spreadsheet pages. Each page may include conventional windowing features and operations, such as moving, re-sizing, and deleting. In a preferred embodiment, the notebook includes 256 spreadsheet pages,

all of which are saved as a single disk file on the mass storage **107**. Workspace **200** may display one or more notebooks, each sized and positioned (e.g., tiled, overlapping, and the like) according to user-specified constraints.

Each spreadsheet page of a notebook includes a 2-D spread. Page A from the notebook **200**, for example, includes a grid in row and column format, such as row 3 and column F. At each row/column intersection, a box or cell (e.g., cell **C4**) is provided for entering, processing, and displaying information in a conventional manner. Each cell is addressable, with a selector being provided for indicating a currently active one (i.e., the cell that is currently selected).

As shown in FIGS. **2C-D**, individual notebook pages are identified by page identifiers **260**, preferably located along one edge of a notebook. In a preferred embodiment, each page identifier is in the form of a tab member (e.g., members **261a**, **262a**, **263a**) situated along a top edge of the notebook. Each tab member may include representative indicia, such as textual or graphic labels, including user selected titles representing the contents of a corresponding page. In FIG. **2C**, the tab members **260** are set to their respective default names. For example, the first three tab members (members **261a**, **262a**, **263a**) are respectively set to A, B, and C. Tab members are typically given descriptive names provided by the user, however. As shown in FIG. **2D**, for example, the first three tab members have now been set to "Contents" (tab member **261b**), "Summary" (tab member **262b**), and "Jan" (tab member **263b**). In a similar manner, the remaining tabs are set to subsequent months of the year. In this manner, the user associates the page identifiers with familiar tabs from an ordinary paper notebook. Thus, the user already knows how to select a page or spread of interest: simply select the tab corresponding to the page (as one would do when selecting a page from a paper notebook).

In addition to aiding in the selection of an appropriate page of information, the user-customizable page identifiers serve aid in the entry of spreadsheet named range addresses. For example, when entering a formula referring to a named range of cells on another page, the user may simply use the descriptive page name in the

named range address, thus making it easier for the user to understand the relationship of the cell(s) or information being referenced.

A general description of the features and operation of the spreadsheet notebook interface may be found in Quattro Pro for Windows *(Getting Started, User's Guide and Building Spreadsheet Applications)*, available from Borland International.

SCALABLE TEMPLATE MANAGEMENT

A. Introduction

The concept of scalable templates

Conventional electronic spreadsheets include built-in means allowing the spreadsheet users to easily organize data into columns and rows, while automating tedious calculations. This set of organized data can be included in either a single range of cells or in a set of several ranges of cells. The range of cells is a quite useful, and widely used object in an electronic spreadsheet environment. It can be defined and processed as a whole entity. For example it can be copied from one place to another place within the spreadsheet or from one spreadsheet file to another spreadsheet file.

Most often, those ranges of cells abides by some kind of structure defining the contents of each cell within an element, defined as a row of the range of cells, and then repeating the same kind of elements a number of times, to store/process a variable number of information pieces. This constitutes a structured range of cells. Referring now to FIG **11A**, a simple example of such a structure, called "Cash Accounting Journal" will be used to illustrate the present application. Let us suppose the user is defining a cash accounting journal **1100** for the month of April 2001, in which is recorded, for each cash transaction, the date of transaction **1101**, the type of transaction **1102** (say, Sale, Expense, Purchase), the object of the transaction **1103**, the amount of money "in" **1104**, the amount of money "out" **1105**, the resulting balance **1106**, and, say, a cumulative sum par type of transaction, i.e., from left to right Cumulative Sales **1107**, Cumulative Expenses **1108**, and Cumulative Purchases **1109**. A

first data row **1110** contains initial values for the computed fields. A last data row **1111** contains final values, with the sum of columns "$ In" **1112** and "$ Out" **1113**. Two title rows **1114** and **1115**, in Bold, are added for presentation and readability purposes. FIG **11A**, illustrates the structure described above, with 4 (four) transactions already recorded, **1116, 1117, 1118** and **1119**. In this example, for each of the 4 (four) transactions, the first 5 (five) columns **1101, 1102, 1103, 1104** and **1105** contain raw information to be entered by the user, while the last 4 (four) columns **1106, 1107, 1108** and **1109** contain formulas that will provide the user with additional information that result from processing the raw data. For example, the cell F4 **1120** contains the following formula : F3+D4-E4, and provides the new cash balance, after the transaction. Some of the formulas contained in the structured range of cells illustrated in FIG **11A**, are shown in the table of FIG **11I**. Now referring again to FIG **11A**, it should be noted, however, that the last 4 (four) columns **1106, 1107, 1108** and **1109**, in the first data row **1110**, contain initial values, i.e. raw data, rather than formulas. For example, the cell F3 **1121** contains the initial value of the balance at the beginning of the month, i.e. $100,00.

Most often also, several instances of similar structured ranges of cells are used. Within the logic of our example, as described above and illustrated in FIG **11A**, a similar structured range of cells is created for each month, for exemple, in a new sheet containing an accounting journal for a given month.

In the current context of electronic spreadsheet environment, where no other tool is really available, instances of such similar structured ranges of cells are frequently be created through cut/copy and paste operations. However, a range of cells shows strong limitations :

- It mixes structure information (such as number of columns, number of rows), format information (such as font style, color or border), contents information (such as formulas or raw data).
- It has a given fixed size at a given instant.

Therefore, creating a new instance of such a structured range of cells, through copy/paste operations, may become complex, lengthy and prone to errors. When the spreadsheet user

wants to create another structured range of cells with the same structure, he/she will need to successively perform several operations :

- **1.** Copying-pasting an existing structured range of cells, thus obtaining another structured range of cells similar to the one illustrated in FIG **11A**.

- **2.** Distinguishing between areas containing raw -or informative- data and areas containing structure specific information such as formulas, or titles. In our example, that means making a distinction between the columns "Date" **1101**, "Type of Transaction" **1102**, "Object of Transaction" **1103**, "$ In" **1104**, and "$ Out" **1105**, which contain raw data, on one hand, and the columns "$ Balance" **1106**, "Cumulative Sales" **1107**, "Cumulative Expenses" **1108**, and "Cumulative Purchases" **1109**, which contain formulas, on the other hand. But, there are some exceptions to the above distinction :

  - **(i)** the title rows **1114** and **1115** do not contain raw data or formulas, they contain specific titles information, that should be kept unchanged.
  - **(ii)** the first data row (Initial Balance) **1110** contains title information in cells B3/C3 **1122**. This title information should be kept unchanged. It also contains initial values rather than formulas in the cells **1121, 1123, 1124, 1125** of the last 4 (four) columns "$ Balance" **1106**, "Cumulative Sales" **1107**, "Cumulative Expenses" **1108**, and "Cumulative Purchases" **1109**. These initial values must be considered as raw data.
  - **(iii)** the last data row (Final Results) **1111** contains title information in cells B8/C8 **1126**, and specific formulas in cells D8 **1112** and E8 **1113**, which should be kept unchanged.

- **3.** Emptying the copied structured range of cells of the copied raw data while trying to keep the structure, format and generic contents. In our example, and now referring to FIG **11B**, the following cells should be cleared : A3..A8 **1127**; B4..E7 **1128**; F3..I3 **1129**. Through our example, and, given the distinction described above between contents that should be kept unchanged and raw data, we can easily understand the complexity of such an action and the number of opportunities for errors, especially as the spreadsheet grows

beyond limits that can be easily viewed and controlled. Once this operation is performed, the resulting range of cells, appears as illustrated in FIG **11B**.

- **4.** Adjusting the size of the copied structured range of cells to his new needs. This size adjustment most often relates to the number of elements of the copied structured range of cells, and not to the structure of the copied structured range of cells. In our example, and referring to FIG **11B**, the copied structured range of cells only contains 4 (four) elements ready to accept data entry, **1130, 1131, 1132** and **1133**. But it is easily conceivable that the copied structured range of cells contains several hundred rows, thus making the size adjustment a real "must". Back to our exemple, and referring to FIG **11B**, we can suppose the user only needs 3 (three) elements for data entry. He will then decide to suppress 1 (one) element, for example, the first element **1130** of the new structured range of cells. In the current context of electronic spreadsheet environment, where no other tool is really available, the user may perform this deletion by using the standard row delete function, or by using the standard row delete in selected range only function. With both options, and depending on the contents of each cell, this may result into errors introduced by the row deletion, as illustrated on FIG **11C**, where cells F4 **1134**, G4 **1135**, H4 **1136** and I4 **1137** are in error because the formulas they each contain was referring to a cell that disappeared during the deletion. The following cells are also shown in error since they reference a cell in error. With the first option, another problem may occur if the row also contains other information outside the range on which the user is performing the delete operation.

- **5.** Correcting any error introduced by the above steps, such as the one described above and illustrated in FIG **11C**. In our example, and referring to FIG **11C**, cell F4 **1134**, G4 **1135**, H4 **1136** and I4 **1137** have to be corrected by entering the correct formulas. For example, in cell F4 **1134** the following formula should be entered +F3+D4-E4. The result of this correction can be seen on FIG **11D**.

- **6.** Eventually, filling the raw data area with default values, in order to make easier subsequent data entry. In our example, and referring to FIG **11D**, we can imagine that the most frequent entry is the sale of a book. Therefore the cells of the column "Type of Transaction" **1138** may be initialised with the default value "Sale" and the cells of the

column "Object of Transaction" **1139** may be initialised with the default value "Book", as illustrated on FIG **11D**.

Furthermore, before the copy-paste operation, on the structured range of cells, takes place, the user must prepare the place for the copied structured range of cells, at the destination location, with the risk, if this is not done, of overwriting, and therefore loosing the preexisting information at this location.

Once the chain of operations described above has been performed, the user is ready to use the structured range of cells by adding data into empty cells and, as needed, modifying the existing data (such as the default values predefined in the columns "Type of Transaction" **1138** and "Object of Transaction" **1139**).

The chain of operations described above rapidly becomes tedious, lengthy and prone to error, especially when manipulated structured ranges of cells increase in size and complexity. In a preferred embodiment of the present invention, a user-friendly solution to these problems is proposed by allowing the electronic spreadsheet user to:

- Define a structure, for a range of cells, including :
  - **(i)** an optional header part made of one or more meta-elements ;
  - **(ii)** a mandatory body part made of one or more elements ;
  - **(iii)** an optional footer part made of one or more meta-elements.

  The structure of **each** meta-element of the header part may be defined in terms of attributes by a meta-element format, and in terms of contents by a meta-element profile.

  The structure of **all** elements of the body part, may be defined in terms of attributes by an element format, and in terms of contents by an element profile.

  The structure of **each** meta-element of the footer part may be defined in terms of attributes by a meta-element format, and in terms of contents by a meta-element profile.

  This structure is called a Scalable Template. In summary, the scalable template defines a structure by specifying the number of fields, by referring to a couple of

element format and element profile that defines all body elements, and, optionally, by referring to one or several couples of meta-element format and meta-element profile that define each meta-element of the header part or the footer part.

- Manage scalable templates and underneath defined objects, known as element formats, element profiles, meta-element formats and meta-element profiles.
- Create, or update element formats, meta-element formats.
- Create, or update element profiles, meta-element profiles.
- Create, or update a scalable template.
- Create a scalable template instance abiding by a defined scalable template.

The above set of functions is supported by a set of tools :

- the "***Scalable Template Manager***" method, or ***STM*** method for short;
- the "***Element Format Editor***" method, or ***EFE*** method for short;
- the "***Element Profile Editor***" method, or ***EPE*** method for short;
- the "***Scalable Template Editor***" method, or ***STE*** method for short;
- the "***Scalable Template Instanciator***" method, or ***STI*** method for short.
- This set of functions is defined in much further details, in the following sections.

In our example, a scalable template is developed to define the generic structure of the "Cash Accounting Journal" and thus to facilitate the creation of several instances of said "Cash Accounting Journal". Now referring to FIG **11D**, the scalable template defining the structure of "Cash Accounting Journal" :

- **(i)** Specifies the number of columns or fields, 9 (nine) in our exemple.
- **(ii)** Defines the header part of "Cash Accounting Journal", through the following steps :
  - Defining the format of the first Title row **1140**, through a meta-element format. This includes, for example, the Bold type for the font.
  - Defining the contents of the first Title row **1140**, through a meta-element profile. This includes, for example, the text of the Title.
  - Defining the format of the second Title row **1141**, through a meta-element format. This includes, for example, the Bold type for the font.

- Defining the contents of the second Title row **1141**, through a meta-element profile. This includes, for example, the text of each column title.
- Defining the format of the first data row **1142**, which contains initial values for the computed fields, through a meta-element format. This includes, for example, the merge of fields B and C.
- Defining the contents of the first data row **1142**, which contains initial values for the computed fields, through a meta-element profile. This includes, for example, the text of "Initial Balance".

- **(iii)** Defines the body part of "Cash Accounting Journal", through the following steps :
  - Defining the format of all standard data rows or elements **1143** to **1145**, through an element format.
  - Defining the contents of all standard data rows or elements **1143** to **1145**, through an element profile. This includes, for example, the default value "Sale" in field **1138**, the default value "Book" in field **1139**, and the formulas in the four rightmost fields **1147**, **1148**, **1149** and **1150**.
- **(iv)** Defines the footer part of "Cash Accounting Journal", through the following steps :
  - Defining the format of the last data row **1146**, which contains final values, through a meta-element format. This includes, for example, the merge of fields B and C.
  - Defining the contents of the last data row **1146**, which contains final values, through a meta-element profile. This includes, for example, the text of "Final Results".

From the above scalable template, one or several scalable template instances, such as the one illustrated in FIG **11D**, can be created, at very limited cost to the user and thus avoiding the many risks for error.

Inserting an element in a scalable template instance

Given the solution briefly described above, and precisely defined in the following sections, the spreadsheet user is now able to define a range of cells structure in a scalable template, and create a scalable template instance abiding by the structure

defined in the scalable template, and comprising a given number of elements, initialised thanks to the element format and element profile. In our example of "Cash Accounting Journal", the newly created scalable template instance would typically appear as illustrated in FIG **11D**. Once this creation is completed, the user may now fill in the scalable template instance with data, immediately take advantage of the predefined, structured instance that provide the necessary results, and save this instance, as part of a spreadsheet file, for further use, as required. In our example, and now referring to FIG **11E**, the user would enter:

- **(i)** the initial values for the field "$ Balance" in cell F3 **1151**, for the field "Cumulative Sales" in cell G3 **1152**, for the field "Cumulative Expenses" in cell H3 **1153**, for the field "Cumulative Purchases" in cell I3 **1154**,
- **(ii)** the dates for the Initial Balance in cell A3 **1155**, and for the Final Results in cell A7 **1156**
- **(iii)** the data for the 3 (three) cash transactions to be recorded in the cash accounting journal in cells A4..E6 **1157**, while taking advantage of the default values (Sale and Book) if applicable.

Once filled with data, the instance comprises data and results, as illustrated on FIG **11E**.

However, the user will rapidly need to update the scalable template instance. Updating such a scalable template instance is also very often complex, lengthy and prone to error. Such updates include additions of new elements. Several types of modifications can be performed without any specific problem in an electronic spreadsheet environment. However, this is not the case for an insertion.

For example, if a row is added through normal electronic spreadsheet functions such as the spreadsheet row insertion method, the row created would be empty. This means that the value for every field of every element needs to be entered, thus leaving the user with heavy data entry or copy/paste workload, while the contents of each element is known to a certain extent, and should follow the general structure of the scalable template instance. This can be illustrated in our example: let us suppose the user wants to record another transaction, in the Cash Accounting Journal, for the date 07/05/01, and now referring to FIG **11E**, between rows **1158** and **1159**. Inserting a row, through the normal spreadsheet

row insertion method, and now referring to FIG **11F**, will result in a new row **1160**, created empty, meaning that the value for every field of the element needs to be entered, thus leaving the user with heavy data entry or copy/paste workload, while the contents of each element is known to a certain extent, and should follow the general structure defined by the scalable template, including, in our example, default values of Sale and Book in cells B6..C6 **1161**, and formulas in cells F6..I6 **1162**. Moreover, normal spreadsheet functions such as the row insertion function may well jeopardize the contents of some neighbour elements. This problem is illustrated with our example, in FIG **11F**. The formula contained in cell F7 **1163** has been changed, by the row insertion operation, to F5+D7-E7, meaning the new balance is not computed from the balance of the previous row but from the balance of the row before the previous row, and will therefore be wrong, as soon as data is entered in the newly created element. In this example, not only the user has to re-enter the formulas in the newly created row, but he also has to check the formulas in neighbour elements and to re-enter the corrupted formulas.

In a preferred embodiment of the present invention, a user-friendly solution to these problems is proposed by allowing the electronic spreadsheet user to:

- change an existing scalable template instance by introducing new elements, with all predefined formats and contents of each field of the element, while insuring the integrity of all elements of the scalable template instance.

The above function is called the "***Scalable Template Instance Insertion Manager***" method, or ***STIIM*** method for short, and is defined in much further details, in the following sections.

In our example, and now referring to FIG **11G**, a new element **1164**, with all predefined formats and contents, is inserted in the existing scalable template instance, with appropriate default values Sale and Book in cells B6..C6 **1165**, appropriate formulas in cells F6..I6 **1166**, while insuring the integrity of all elements of the scalable template instance. This integrity can be illustrated, in our example, for which, referring to FIG **11G**, the formula of cell F7 **1167** has been changed, by the insertion of the new instance element, to F6+D7-E7, meaning the new balance is appropriately computed from the balance of the previous row. In this example, the

user not only avoids re-entering the formulas in the newly created element, but also avoids checking and correcting the formulas in neighbour elements.

Deleting an element from a scalable template instance, deleting a scalable template instance

Deleting an element of a scalable template instance also is an operation prone to error. As a matter of fact, normal spreadsheet functions such as the row deletion function may well jeopardize the contents of some neighbour elements, leading to unresolved references producing an error or, even worse, to wrong formulas that may be difficult to identify. This can easily be illustrated by our example. Referring to FIG **11G**, let us suppose that the user wants to delete the element on row 6 **1164**. Now referring to FIG **11H**, this will result in errors on row 6 **1168** (which previously was row 7) and row 7 **1169** due to unresolved formulas on row 6 **1168** because cells previously referenced were deleted. Although this unresolved reference problem is quite natural in a normal electronic spreadsheet environment, it is not justified in a structured environment such as the scalable template instance, in which the knowledge of the structure, where the element deletion happens, allows to properly resolve the updates of the formulas. Solving this problem requires some "context intelligence", taking into account the structure of the scalable template instance in which the element deletion occurs.

Another need appears when the spreadsheet user selects one or a plurality of cells and then invokes the conventional Delete function.

- If the selection does not belong to a scalable template instance, then the processing of a conventional Delete function may have some detrimental side-effects on existing scalable template instances. Furthermore such side-effects may not be clearly visible by the spreadsheet user at the time he/she invokes the Delete function. A typical example of this situation occurs for instance when the spreadsheet user initiates the deletion of a column which has a not empty intersection with an existing scalable template instance not visible on the display device **106**. In this case, the column deletion operation looks safe to the spreadsheet user although it will break the structure of the scalable template instance which is not visible on the display device **106** and which partially

overlaps with the column to be deleted. To guarantee that such a delete operation will not negatively impair any existing scalable template instance, the spreadsheet user has no other choice than carefully scanning the entire spreadsheet (including the part not visible on the display device **106**) to determine any risk of scalable template instance corruption. This operation may prove to be very difficult, and prone to errors, especially when existing scalable template instances increase in number.

- If the selection belongs to a scalable template instance, calling the Delete function by means of a menu or by pressing the "Delete" key, leaves room to ambiguity as to what the user wants to perform. In the current context of electronic spreadsheet environment, where no other tool is really available, this must be done by selecting the exact area to be deleted, which may prove to be very difficult, especially when manipulated structured ranges of cells increase in size and complexity. Solving this problem requires additional "context intelligence" to detect this situation, to take advantage of the structure of the scalable template instance and to offer the relevant choice to the user. The possible alternatives are the deletion of the whole scalable template instance, or the deletion of the selected scalable template instance elements, or the deletion of the content of the cells within the selected scalable template instance elements, or the deletion of the content of the cells within the selected range of cells. In the two former alternatives, a further distinction must be done to identify within the scalable template instance elements the cells belonging to user entry fields. Indeed the content of such cells can be cleared without breaking the structure of the scalable template instance, while other cells (which typically contain formulas producing results) must be kept unchanged to preserve the integrity of the scalable template instance. To secure this scalable template instance integrity, the spreadsheet user has no other choice that carefully determining, cell by cell, if it carries user-specified information that can be cleared, or if it produces a result through a formula that must be preserved. This operation may prove to be very difficult, and prone to errors, especially when existing scalable template instances increase in size and complexity.

In a preferred embodiment of the present invention, a user-friendly solution to these problems is proposed by allowing the electronic spreadsheet user to:

- select what is to be deleted (cells content or scalable template instance element or whole scalable template instance), upon the automatic prompt triggered by calling the conventional Delete function,
- delete, within a scalable template instance, either the contents of input fields within selected cells, or the contents of input fields within selected elements, or the whole selected elements, while maintaining the overall integrity of the scalable template instance, or
- delete a whole scalable template instance.

The above function is called the "***Scalable Template Instance Deletion Manager***" method, or ***STIDM*** method for short, and is defined in much further details, in the following sections.

In our example, and referring to FIG **11G**, when one or several cells of row 6 **1164** is(are) selected, and when the user calls the deletion function through a menu or by pressing the "Delete" key, then the user is prompted to choose between deleting the contents of the selected cells, deleting the whole element on row 6 **1164**, or deleting the whole scalable template instance. When the user selects the deletion of the scalable template instance element, the whole element on row 6 **1164** is deleted while maintaining the integrity of the remaining scalable template instance. The result of this operation is a scalable template instance with no error, as illustrated on FIG **11E**.

Refreshing a scalable template instance upon the modification of one of the parent element format, element profile, meta-element format or meta-element profile.

Once created and used, the scalable templates have their own life cycles, meaning that they are created but they also need to be modified by the user. Upon such modifications of a scalable template, the need often appears to retrofit those changes on existing scalable template instances abiding by the structure of the

modified scalable template. This is typically the case of a correction in a formula : the user wishes to retrofit the changes onto all existing scalable template instances. To be more specific, when a user changes a formula, in a given field of an element profile of a scalable template, most often, he actually wants to change the formula in a given field of every element of every scalable template instance already created and every scalable template instance to be created. Once the formula in the element profile of a scalable template has been changed, the updated formula will be included in every element of every child scalable template instance to be created. On the other hand, changing the formula in every element of every scalable template instance already created should be done manually. It is a long and complex operation, requiring a lot of data entry and/or copy-paste operations. This operation is not only long and complex, but is also prone to errors, especially when manipulated scalable template instances increase in size, complexity and number.

This can be illustrated in our example. Now referring to FIG **11J**, the user records, in a new element **1170**, a new transaction : a customer returns a book. The user wants to record this transaction as a "negative" sale (the money is flowing "out" of the Cash Box), by entering the amount in the "$ Out" field. The user immediately detects that the current structure of his Cash Accounting Journal does not support this type of transaction : If the Balance is shown correct in cell F7 **1171**, the Cumulative Sales amount, in cell G7 **1172**, is shown incorrect. Now referring to FIG **11I**, this error can easily be understood by looking at the formulas contained in the field "Cumulative Sales" : the "$ Out" value is not taken into account. In order to correct this problem, the user has to update the formula. In this situation, it is obvious that the formula must not be updated only in the cell G7 **1172**. It must be updated in the scalable template itself and in all scalable templates instances abiding by the modified scalable template.

The previous scenario, illustrated so far in the case of a cell containing a formula, applies if the spreadsheet user wishes to modify the content of a cell corresponding to an entry field within an element profile of a scalable template. Nevertheless some specific attention must be taken to avoid overwritting any specific information previously filled by the spreadsheet user in an element of an existing scalable

template instance which abides by the updated profile definition. For this purpose, the spreadsheet user has no other choice than carefully scanning each of these elements that abide by the updated profile definition, to determine if the entry field was already filled by user-specified information (which should be left untouched to avoid loosing it), or was filled by the defaut content specified in the previous profile definition, which can be replaced by the new content specified in the updated profile definition, without loosing any user-specified information.

In a preferred embodiment of the present invention, a user-friendly solution to these problems is proposed by allowing the electronic spreadsheet user to:

- Automatically refresh each existing scalable template instance abiding by the structure defined in a scalable template, when the parent scalable template is updated, through the update of an element format, element profile, meta-element format or meta-element profile.

The above function is called the "***Scalable Template Refresh Manager***" method, or ***STRM*** method for short, and is defined in much further details, in the following sections.

Copying-Cutting/Pasting a scalable template instance

A scalable template instance is an object that the user needs, at given times, to copy-and-paste or cut-and-paste.

The copy-cut function for a scalable template instance can be performed using standard spreadsheet function, since the scalable template instance is comprised in a range. However, several limitations appear in the standard range copy/cut function :

- The selection of the range corresponding to the scalable template instance is a mandatory, sometime painful, operation, while it is possible to detect, at the time the copy-cut command is issued, that the current cell/selection belongs to a scalable template instance, and therefore offer the possibility to copy-cut the whole instance.

- The standard copy-cut range function does not copy-cut the scalable template instance related information, such as the reference to the parent scalable template. This means that rather than copying/cutting a scalable template instance, only the range is really copied-cut.
- In the case of the cut function, the related entry in the scalable template instance table is not removed, as necessary.

The paste function can, as well, be performed, using standard spreadsheet function. However, additional limitations appear in the standard range paste function :

- The standard paste function overwrites the previous contents of cells, thus presenting the risk of loosing information. This forces the user to make up available space for the paste, to avoid loosing data. Making up available space requires to determine the exact space necessary. Since the geometry of a scalable template instance is known, the process can therefore be automated, like it can be automated when a scalable template instance is created.
- The standard paste function would not create the related entry in the scalable template instance table necessary to really have a scalable template instance rather than a simple range.

Additionally, the standard range copy/cut and paste function do not allow to paste a scalable template instance in lieu and place of another existing scalable template instance abiding by the same template.

Also, at the time the user has selected one or more cells belonging to a scalable template instance and calls the copy-cut function, there is an ambiguity as to what the user wants to perform. He/she may want to copy/cut the content of selected cells, copy/cut one or several elements of the scalable template instance, or copy/cut the whole scalable template instance.

Finally, as the user copies-cuts/pastes, ranges of the spreadsheet that do not belong to a scalable template instance, there is a value to protect the integrity of existing scalable template instances, from any side effect.

In a preferred embodiment of the present invention, a user-friendly solution to these problems is proposed by :

- allowing the electronic spreadsheet user to :
  - copy/cut a scalable template instance,
  - paste a scalable template instance in lieu and place of another existing instance,
  - paste a scalable template instance in any other area of the spreadsheet, after automatically preparing the necessary space to protect preexisting data,
  - copy/cut one or several scalable template instance elements,
  - paste one or several scalable template instance elements,
- automatically detecting that the current cell or selection is in a scalable template instance, and offering the user the options to copy-cut a scalable template instance or scalable template instance elements rather than a cell or range.

The above set of functions is supported by a set of tools : the "***Scalable Template Instance Copy Manager***", the "***Scalable Template Instance Cut Manager***" and the "***Scalable Template Instance Paste Manager***" methods, or ***STICopyM, STICutM, and STIPasteM*** methods for short. This set of tools is described in much further details in the following sections.

Exporting and importing element/meta-element formats/profiles and scalable templates.

As the user defines, in a given spreadsheet file, a set of element formats, meta-element formats, element profiles, meta-element profiles, and scalable templates (further referred to as scalable templates items), he is really developing an intellectual capital that may result from important development efforts, and may therefore carry a high value for the user. It is not unusual that this set of developed scalable template items, or a subset of it, can be useful in another spreadsheet file. In such a case, the user would waste a considerable amount of energy if he had to develop again the same set of template items. Copy/paste operations is, of course, an alternative, but individual copy/paste operations of such template items may indeed be in itself a huge operation.

In a preferred embodiment of the present invention, a user-friendly solution to this problem is proposed by allowing the electronic spreadsheet user to:

- Export scalable template items (i.e. element formats, element profiles, meta-element formats, meta-element profiles and scalable templates) from a spreadsheet file,
- Import scalable template items (i.e. element formats, element profiles, meta-element formats, meta-element profiles and scalable templates) into a spreadsheet file,

and, therefore, be able to reuse, in any spreadsheet file, the set of scalable templates items, that have been defined in any other spreadsheet file.

The above set of functions is supported by a set of tools : the "***Scalable Template Export Manager***" method, or ***STEM*** method for short, and the "***Scalable Template Import Manager***" method, or ***STIM*** method for short, and is described in much further details in the following sections.

Exporting and importing the IN (or data) portion of scalable templates instances.

During their own life cycle, scalable template instances will grow in size and the amount of data stored to save such a scalable template instance may become prohibitive. This is true while, on the other hand, it is obvious that an important portion of each element of scalable template instances may be constituted of OUT fields only comprising formulas, without any source, or essential data. Those fields, being similar from element to element, actually comprise redundant information, not redundant from an end user prospective, since it certainly is useful to display results or intermediate results, but redundant from an essential prospective because it can be recreated from the base structure information of the scalable template instance, i.e. scalable template, element format, element profile, meta-element format, meta-element profile. Storing and/or conveying this redundant information is a waste that could be avoided if a mechanism would allow to only store/convey the informative data and the base structure information.

In order to solve this problem, there is value in making a clear and formal distinction between IN fields aimed at receiving raw or informative data from the user and OUT fields, most often containing fixed values or formulas, aimed at providing results or intermediate results to the user.

In our example, and now referring to FIG **11B**, when considering the scalable template instance illustrated, the cells A3..A8 **1127**, B4..E7 **1128**, and F3..I3 **1129**, are aimed at containing IN data. Other cells of the scalable template instance are aimed at providing results, using fixed content or formulas defined in the scalable template.

In a preferred embodiment of the present invention, a user-friendly solution to this problem is proposed by allowing the electronic spreadsheet user to:

- export the IN (or informative) data of a scalable template instance,
- import the previously exported IN (or informative) data of a scalable template instance, into another scalable template instance. If this previously exported IN data is imported into a scalable template instance abiding by the same structure, i.e. with the same parent scalable template, and with the same number of elements, it will reconstitute an exact copy of the original scalable template instance. The previously exported IN data may also be imported into another scalable template instance, abiding by a slightly different structure. There is value in performing such an operation, as long as the IN data is relevant in the import scalable template instance. There is, therefore, value in allowing such an operation.

The above capability results in significant user time, transmission time and storage space savings, and therefore in important cost savings. This also facilitates remote collaboration through file exchange.

In our example, and referring again to FIG **11B**, the IN data of the scalable template instance illustrated, i.e. the content of the cells A3..A8 **1127**, B4..E7 **1128**, and F3..I3 **1129**, can be exported, stored and conveyed. This limited set of data, together with the parent scalable template of the instance, contains all the information necessary

to recreate the original scalable template instance. This limited set of data can then be imported into another scalable template instance (thus reconstituting an exact copy of the original scalable template instance if the import scalable template instance abides by the same parent scalable template and has the same number of elements than the original instance).

The above set of functions is supported by a set of tools : the "***Scalable Template Instance Export Manager***" method, or ***STIExportM*** method for short; the "***Scalable Template Instance Import Manager***" method, or ***STIImportM*** method for short. This set of tools is described in much further details in the following sections.

Using a sort application with scalable template instances

Sorting data in a spreadsheet environment, and more specifically in a structured range of cells is a quite natural, often necessary operation. Considering existing tools and prior art, within an electronic spreadsheet environment, this operation can be performed, by the user, who first selects a range of cells and, then, calls the standard sort application. When performed in a spreadsheet comprising scalable template instances, the sort operation may introduce errors or break the consistency of a scalable template instance. This is the case if the range of cells selected prior to the call to the sort function (for example A1..K92) overlaps the range occupied by a scalable template instance (for example H70..N105). This is also the case if the range of cells selected prior to the call to the sort function overlaps the body and the footer of a scalable template instance. Moreover, at the time the user has selected one or more cells belonging to a scalable template instance and calls the sort application, there is an ambiguity as to what the user wants to perform. He/she may want to sort the contents of selected cells, sort one or several elements of the scalable template instance, or sort the whole scalable template instance.

Sorting a whole scalable template instance is a useful operation. However, to make it a meaningful operation, i.e. respect the structure of the scalable template instance, only element of the body must be sorted.

In our example, one simple sort application that could be used with all Cash Accounting Journals, is a "Date sorting" application. Now referring to FIG **11J**, this date sorting

application must sort the elements of the Cash Accounting Journal, in ascend order, on the range A4..A7 **1173**.

In a preferred embodiment of the present invention, a user-friendly solution to this problem is proposed by allowing the electronic spreadsheet user to:

- sort ranges within the spreadsheet file, while protecting the consistency of existing scalable template instances,
- sort several elements of a scalable template instance,
- sort a whole scalable template instance (i.e. all elements of the body part of a scalable template instance).

The above function is referred to as the "***Scalable Template Instance Sort Application Manager***" method, or ***STISAM*** method for short, and is defined in much further details, in the following sections.

B. Concepts and Vocabulary

The purpose of this section is to formalize both some concepts (with associated objects) and some vocabulary defined within the scope of the present invention. In the following descriptions, it is assumed that spreadsheets are in two dimensions (2D), so that tables and structures can be described in a 2D environment. Moreover it is assumed that tables are organized vertically, so that the table headings are on the top of the table instead of being on its left. This allows to significantly clarify the description of the various original concepts, objects, and methods which are part of the present invention, but this does not limit in any way the scope of the invention. In other words, the underneath description can be generalized to environment with either 2D tables organized horizontally or with 3D tables, without departing from the spirit of the present invention.

B1. Preliminary Definitions

Structured Range of Cells : a structured range of cells is a range of cells that abides by some kind of structure organising the data into rows and columns. Columns define fields

aimed at containing the same kind of information on each row. Rows define records (or elements).

Table : the word table can be used to designate a structured range of cells.

Field : a field is a labeled column in a database or table that contains the same kind of information for each record (or element). For example, a customer table may contain fields labeled Name, Address and Tel #.
By extension, in a given record (or element), a given field refers to the cell located at the intersection of the record (or element) and the given field (labeled column).

The above definitions are for a 2D environment where columns define fields and rows define records. They can be transposed in a 2D environement where rows define fields and columns define record. They can also be transposed in a 3D environment, where, for example, sheets define records.

IN/OUT Cell: a cell is specified as "IN" cell when assumed to be used for recording user provided information. A cell is specified as "OUT" cell when assumed to be used for producing information (generally obtained through formulas whose arguments refer directly or indirectly to "IN" cells).

B2. Object Definitions

The following objects are defined to help the understanding of the invention.

Element Format : an element format is a spreadsheet object defining the structure of an element within a 2 dimensions or a 3 dimensions range of cells, in terms of format attribute :

- Background attributes (color, pattern, etc...),
- Alignment attributes (horizontal, vertical, text wrapping, alignment across columns, etc...)
- Font attributes (size, color, etc...)
- Line attributes (type, color, etc...)

- Protection of the field
- and any other conventional format attribute.

Example: Referring now to FIG. 3, an element format EF_Body **301** could define the structure of a 2 dimension range as a 3 field table, where the first field is with bold font, left justified ; where the second field is with normal font, left justified ; and where the third field is with normal font, centered.

Meta-Element Format : a meta-element format is a spreadsheet object defining the structure of a meta-element within a 2 dimensions or a 3 dimensions range of cells, in terms of format attribute :

- Background attributes (color, pattern, etc...),
- Alignment attributes (horizontal, vertical, text wrapping, cell merging, etc...)
- Font attributes (size, color, etc...)
- Line attributes (type, color, etc...)
- Protection of the field
- and any other conventional format attribute.

Example: A meta-element format MEF_Header **302** could define the structure of a 2 dimensions range by defining it as a 3 column, single row structure made of three fields, each field being bordered by a solid line.

Example: A meta-element format MEF_Yellow **303** could define the structure of a meta-element part of a 2 dimensions range by defining it as a 3 cell structure, all with yellow background color, and where the two left most cells are aligned across columns (a.k.a. "merged cells").

Element Profile : an element profile is a spreadsheet object defining the structure of an element within a 2 dimensions or a 3 dimensions range of cells, in terms of content and destination :

- formulas for fields to be computed from data comprised in other fields of the same element, or in other fields of another element or meta-element of the same instance, or even in other fields outside the instance.

- field default values to be assigned at element creation time.
- destination of the cells (data entry for "IN" cells or data produced for "OUT" cells).

Example: An element profile EP_Body **304** could define the structure of a 2 dimension range as a 3 fields table, where the first field has a default value "New Name", where the second field has a default value "New First Name" and where the third field has a void default value.

Meta-Element Profile : a meta-element profile is a spreadsheet object defining the structure of a meta-element within a 2 dimensions or a 3 dimensions range, in terms of content and destination :

- formulas for cells to be computed from data comprised in other cells of the same element, or in other cells of another element or meta-element of the same instance, or even in other cells outside the instance.
- cell default values to be assigned at meta-element creation time.
- destination of the cells (data entry for "IN" cells or data produced for "OUT" cells)

Example: A meta-element profile MEP_Header **305** could define the structure of a 2 dimensions range by defining it as a 3 cell structure, the leftmost cell being filled with the content "Family name", the middle cell being filled with the content "First Name", and the rightmost cell being filled with the content "Age". All these three cells are "OUT" cells.

Example: A meta-element profile MEP_Average **306** could define the structure of a 2 dimensions range by defining it as a 3 cell structure, the leftmost cell being filled with the content "Average", the middle cell being filled with a void content, and the rightmost cell containing a formula computing the average value of the rightmost field of the elements within the instance. All these three cells are "OUT" cells.

Scalable Template (also referred to as "Template") : A scalable template is a spreadsheet object defining the structure of a 2 dimensions or a 3 dimensions range of cells, in terms of {element + meta-elements} layout. The word "scalable" refers to the capability of the scalable template of defining a given structure for variable size (e.g. ranging from a minimum value to a maximum value) range of cells. The scalable template defines a structure by :

- specifying the number of fields,
- by referring to a couple of element format and/or element profile that defines each body element, and,
- optionally, by referring to one or several couples of meta-element formats and/or meta-element profiles.

In a 2 dimensions environment, such meta-element formats / profiles are either located above the element format / profile, constituting the scalable template "header" part, or located below the element format / profile, constituting the scalable template "footer" part. Either the scalable template "header" part or the scalable template "footer" part, or both of them may be empty.

When the element and meta-element references are only constituted by element profiles and meta-element profiles, then the scalable template only carries contents information and can thus be named **Scalable Profiled Template.**

When the element and meta-element references are only constituted by element formats and meta-element formats, then the scalable template only carries format information and can thus be named **Scalable Formatted Template.**

When the element and meta-element references are constituted by any combination of both profiles and formats, then the scalable template carries both profile and format information and can thus be named **Scalable Profiled & Formatted Template.**

Example: A scalable template SFT_A **307** could define the structure of a 2 dimensions range by defining a three column (referred to as A, B, C) structure made by a top meta-element format MEF_Header **302** (the "header" part), a

middle element format EF_Body **301** and a bottom meta-element format MEF_Yellow **303** (the "footer" part).

Example: A scalable template SPT_A **308** could define the structure of a 2 dimensions range by defining a three field (referred to as A, B, C) structure made by a top meta-element profile MEP_Header **305** (the "header" part), a middle element profile EP_Body **304** and a bottom meta-element profile MEP_Average **306** (the "footer" part).

Example: A scalable template SPFT_A **309** could define the structure of a 2 dimensions range by defining a three field (referred to as A, B, C) structure made by a top meta-element format MEF_Header **302** coupled with a top meta-element profile MEP_Header **305** (both constituting the "header" part), a middle element format EF_Body **301** coupled with a middle element profile EP_Body **304** and a bottom meta-element format MEF_Yellow **303** coupled with a bottom meta-element profile MEP_Average **306** (both constituting the "header" part).

Scalable Template Instance (also referred to as "Instance" or "scalable instance") : A scalable instance is a spreadsheet object abiding by the structure of a defined scalable template : a scalable formatted template, or a scalable profiled template, or a scalable profiled & formatted template. An instance may be viewed as a child object of the scalable template. It contains a variable number of elements (at least one) containing information, in each field, corresponding to the parent structure, and constituting the "body" part, plus optionally one or several meta-elements, as defined by the scalable template, and constituting the "header" part and the "footer" part of the scalable template instance.

Example: Referring now to FIG **4**, an instance SFTI_A **401** is created, with a specified number of 3 elements structured according to the scalable formatted template SFT_A **307**. The instance SFTI_A **401** is then a 2 dimensions table, with 3 columns, made of three parts. The top "header" part is a meta-element ME_Header **402**, abiding by the meta-element format MEF_Header **302**, made

of three cells, all bordered with a solid line. The second "body" part is a 3 column wide table made of a variable number of elements (3 in the example), all abiding by the element format EF_Body **301**, so that the first field is with bold font, left justified ; the second field is normal font, left justified ; and the third field is normal font, centered. The bottom "footer" part is a meta-element ME_Yellow **403** abiding by the meta-element format MEF_Yellow **303**, made of three cells, all with yellow background color. Each element of the instance (within the middle "body" part) would be 3 column wide. A variable number (between minimum and maximum size) of elements, initially empty, could be added to the instance SFTI_A **404** and filled by the user.

Example: An instance SPTI_A **405** is created, with a specified number of 3 elements structured according to the scalable profiled template SPT_A **308**. The instance SPTI_A **405** would then be a 2 dimensions table, with 3 columns, made of three parts. The top "header" part is a meta-element ME_Header **406**, abiding by the meta-element profile MEP_Header **305**, made of three cells, respectively filled with contents "Family Name", "First Name" and "Age". The second "body" part is a 3 column wide table made of a variable number of elements (3 in the example), all abiding by the element profile EP_Body **304**, respectively initialised with default values "New Name", "New First Name" and void. The bottom "footer" part is a meta-element ME_Yellow **407** abiding by the meta-element profile MEP_Average **306**, made of three cells, respectively filled with contents "Average", void, "@INSTAVE(#samecol)". Each element of the instance (within the middle "body" part) would be 3 column wide. A variable number (between minimum and maximum size) of elements, initially filled with default values, could be added to the instance SPTI_A **408**, and then filled by the user.

Example: An instance SPFTI_A **409** is created, with a specified number of 3 elements structured according to the scalable profiled & formatted template SPFT_A **309**. The instance SPFTI_A **409** would then be a 2 dimensions table, with 3 columns, made of three parts. The top "header" part is a meta-element ME_Header **410**, abiding by the meta-element format MEF_Header **302** and the meta-element profile MEP_Header **305**, made of three cells, all bordered with a

solid line, respectively filled with contents "Family Name", "First Name" and "Age". The second "body" part is a 3 column wide table made of a variable number of elements (3 in the example), all abiding by the element format EF_Body **301** and the element profile EP_Body **304**, respectively initialised with default values "New Name", "New First Name" and void, and so that the first field is with bold font, left justified ; the second field is normal font, left justified ; and the third field is normal font, centered. The bottom "footer" part is a meta-element ME_Yellow **411** abiding by the meta-element format MEF_Yellow **303** and a meta-element profile MEP_Average **306**, made of three cells, all with yellow background color, respectively filled with contents "Average", void, "@INSTAVE(#samecol)". Each element of the instance (within the middle "body" part) would be 3 column wide. A variable number (between minimum and maximum size) of elements, initially filled with default values, could be added to the instance SPFTI_A **412** and then filled by the user.

Element : An element is a spreadsheet object belonging to a scalable instance, and made of elementary fields abiding either by an element format, or by an element profile, or by a couple (element template, element profile) found in the parent structure (respectively scalable formatted template, or scalable profiled template, or scalable profiled & formatted template). Without loosing any generality, it is assumed that an element always abides by a couple (element template, element profile), where either the element template or the element profile can be reduced to a void object.

Example : An element of instance SFTI_A **404** can contain "Aureglia" in the first element field, "Jean-Jacques" in the second element field and "42" in the third element field. A similar element could be found in other instances like SPTI_A **408** and SPFTI_A **412**.

Meta-Element : A meta-element is a spreadsheet object belonging to an instance, and made of elementary cells abiding either by a meta-element format, or by a meta-element profile, or by a couple (meta-element template, meta-element profile). Without loosing any generality, it is assumed that a meta-element always abides by

a couple (meta-element template, meta-element profile), where either the meta-element template or the meta-element profile can be reduced to a void object.

Example: In the scalable template instance SFTI_A **404**, a meta-element ME_Header **413** is abiding by the MEF_Header **302** meta-element format, and a meta-element ME_Yellow **414** is abiding the MEF_Yellow **303** meta-element format.

All the objects introduced above can be advantageously arranged in a positioning diagram, as shown in FIG **5**. Element formats **501**, meta-element formats **502**, element profiles **503**, meta-element profiles **504** are part of scalable templates **505**, or **506** or **507**. In turn elements **508** or **509** or **510** and meta-elements **511** or **512** or **513** are respectively part of scalable template instances **514** or **515** or **516** which respectively abide by scalable templates **505** or **506** or **507**.

C. Tables used for managing Scalable Template objects

As introduced in the previous section, the preferred embodiment of the present invention relies on different types of objects for managing scalable templates. These objects are recorded in different repositories, so that they can be accessed and updated by the different methods which are part of the preferred embodiment of the present invention. Such repositories are referred to as tables:

- the ***Element Format Table*** or ***EFT*** for short,
- the ***Element Profile Table*** or ***EPT*** for short,
- the ***Scalable Template Table*** or ***STT*** for short,
- the ***Scalable Template Manager Table*** or ***STMT*** for short.
- The ***Scalable Template Descriptor Table*** or ***STDT*** for short.
- The ***Scalable Template Instanciator Table*** or ***STIT*** for short.
- The ***Scalable Template Export-Import Table*** or ***STEIT*** for short.
- The ***Scalable Template Instance Export-Import Table*** or ***STIEIT*** for short.
- The ***Exported Scalable Template Instance Table*** or ***ESTIT*** for short.

The ***EFT***, ***EPT***, ***STT***, ***STDT*** and ***STIT*** tables are saved as part of the spreadsheet disk file on the mass storage **107**, whereas the ***STMT*** table is temporarily saved on the main memory **102** and the ***STEIT***, ***STIEIT*** and ***ESTIT*** tables are saved on spreadsheet export-import files and spreadsheet instance export-import files.

C1. Element Format Table

Referring now to FIG. **7A**, the ***EFT*** Table **700** corresponds to a logical simple structure made of several records **701**, each of them corresponding to an element format or to a meta-element format, according to the present invention. Each record includes six fields:

- The *"Name"* **702** field is used for recording a character string which uniquely identifies the element format or the meta-element format described by the current record **701**.

- The *"Last Change Date"* **703** field is used for recording the date of the last update of the element format or the meta-element format described by the current record **701**.

- The *"Description Ptr"* **704** field is a reference pointing to the memory location where is recorded an illustrative range of cells depicting the element format or meta-element format described by the current record **701**. This memory location can either be on the Mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention.

- The *"Row #"* **705** field is used for recording the number of rows present in the element format or in the meta-element format described by the current record **701**. This field is relevant for 3D scalable templates where element or meta-element formats correspond to 2D structures. In the preferred embodiment of the present invention where 2D scalable templates are assumed, this field is always filled with the value 1.

- The *"Column #"* **706** field is used for recording the number of columns present in the element format or in the meta-element format described by the current record **701**.

- The *"Type"* **707** field is used for recording different attributes associated to the element format or to the meta-element format described by the current record **701**: this is the "META" attribute **708** specifying if the current record **701** describes an element format or a meta-element format (with respective values "NO" and "YES"), and the "REFERENCED" attribute **709** specifying if there is at least one scalable template or at least one scalable template instance or none of them which refers to this element format or meta-element format (with respective values "TEMPLATE", "INSTANCE" and "NONE"). Conventional techniques can be used for encoding these different attributes in this "*Type*" field, such as executing bit-wise XOR operations with predefined bit patterns, but any other conventional means could be used instead without departing from the spirit of the invention.

C2. Element Profile Table

Referring now to FIG. **7B**, the ***EPT*** Table **710** corresponds to a logical simple structure made of several records **711**, each of them corresponding to an element profile or to a meta-element profile, according to the present invention. Each record includes six fields:

- The *"Name"* **712** field is used for recording a character string which uniquely identifies the element profile or the meta-element profile described by the current record **711**.

- The *"Last Change Date"* **713** field is used for recording the date of the last update of the element profile or the meta-element profile described by the current record **711**.

- The *"Description Ptr"* **714** field is a reference pointing to the memory location where an illustrative range of cells depicting the element profile or meta-element

profile described by the current record **711** is recorded. This memory location can either be on the Mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention.

- The *"Row #"* **715** field is used for recording the number of rows present in the element profile or in the meta-element profile described by the current record **711**. This field is relevant for 3D scalable templates where element or meta-element profiles correspond to 2D structures. In the preferred embodiment of the present invention where 2D scalable templates are assumed, this field is always filled with the value 1.

- The *"Column #"* **716** field is used for recording the number of columns present in the element profile or in the meta-element profile described by the current record **711**.

- The *"Type"* **717** field is used for recording different attributes associated to the element profile or to the meta-element profile described by the current record **711**: this is the "META" attribute **718** specifying if the current record **701** describes an element profile or a meta-element profile (with respective values "NO" and "YES"), and the "REFERENCED" attribute **719** specifying if there is at least one scalable template or at least one scalable template instance or none of them which refers to this element profile or meta-element profile (with respective values "TEMPLATE", "INSTANCE" and "NONE"). Conventional techniques can be used for encoding these different attributes in this "*Type*" field, such as executing bit-wise XOR operations with predefined bit patterns, but any other conventional means could be used instead without departing from the spirit of the invention.

C3. Scalable Template Table

Referring now to FIG. **7C**, the ***STT*** Table **720** corresponds to a logical simple structure made of several records **721**, each of them corresponding to a scalable template, according to the present invention. Each record includes six fields:

- The *"Name"* **722** field is used for recording a character string which uniquely identifies the scalable template described by the current record **721**.

- The *"Last Change Date"* **723** field is used for recording the date of the last update of the scalable template described by the current record **721**.

- The *"Description Ptr"* **724** field is a reference pointing to the memory location where a description of the scalable template described by the current record **721** is recorded. This memory location can either be on the mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention. This description is structured according to the STDT table **760** illustrated in FIG **7E**, that is as an ordered list of couples of names, each couple being made by the name of an element or meta-element format and by the name of an element or meta-element profile.

- The *"Min Element #"* **725** field is used for recording the minimum number of elements found in every scalable template instance abiding by the scalable template described by the current record **721**.

- The *"Max Element #"* **726** field is used for recording the maximum number of elements found in every scalable template instance abiding by the scalable template described by the current record **721**.

- The *"Type"* **727** field is used for recording different attributes associated to the scalable template described by the current record **721**: this is the "META" attribute **728** which always take the value "NO", and the "REFERENCED" attribute **729** specifying if there is at least one scalable template instance or none of them which refers to this scalable template (with respective values "INSTANCE" and "NONE"). Conventional techniques can be used for encoding these different attributes in this "*Type*" field, such as executing bit-wise XOR operations with predefined bit patterns, but any other conventional means could be used instead without departing from the spirit of the invention.

C4. Scalable Template Manager Table .

Referring now to FIG. **7D**, the ***STMT*** Table **730** corresponds to a logical simple structure made of several records **731**, each of them corresponding to an object managed by the scalable template manager, according to the preferred embodiment of the present invention. Each record includes seven fields:

- The *"Name"* **732** field is used for recording a character string which uniquely identifies the object described by the current record **731**.

- The *"Last Change Date"* **733** field is used for recording the date of the last update of the object described by the current record **731**.

- The *"Description Ptr"* **734** field is a reference pointing to the memory location where is recorded a description of the object described by the current record **731**. This memory location can either be on the Mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention.

- The *"Info Field 1"* **735** field is used for recording a first piece of information associated to the object described by the current record **731**.

- The *"Info Field 2"* **736** field is used for recording a second piece of information associated to the object described by the current record **731**.

- The *"Type"* **737** field is used for recording different attributes associated to the object described by the current record **731**, such as the attributes "META" **739** and "REFERENCED" **740** previously described for the similar "*Type*" fields **707**, **717** and **727**, and also two other attributes:
  - the "SELECTED" attribute **742** reflecting whether the associated object has been or not selected by the spreadsheet user within the Scalable Template Manager Dialog Box **600**, (with respective values "YES" and "NO"), and also

- the "NATURE" attribute **741** reflecting whether the object is a "FORMAT", or a "PROFILE", or a "TEMPLATE" (with respective values "FORMAT", "PROFILE", and "TEMPLATE").

Conventional techniques can be used for encoding these different attributes in this "*Type*" field, such as executing bit-wise XOR operations with predefined bit patterns, but any other conventional means could be used instead without departing from the spirit of the invention.

- The "*Index*" **738** field is used for sorting the ***STMT*** table, as performed by the ***Scalable Template Manage***r method.

C5. Scalable Template Descriptor Table

Referring now to FIG. **7E**, the ***STDT*** Table **760** corresponds to a logical simple structure made of several couples of element or meta-element format **765** and of element or meta-element profile **764**. This structure is organised into three sub-sets:

- The optional scalable template "*Header*" part **767**, made of a variable number (possibly null) of couples like the top couple **761**. Each of these couples is constituted by a meta-element format (column **765**) and by a meta-element profile (column **764**).

- The mandatory *"Body"* part **762** made of a single couple constituted by an element format (column **765**) and by an element profile (column **764**).

- The optional scalable template "*Footer*" part **766**, made of a variable number (possibly null) of couples like the bottom couple **763**. Each of these couples is constituted by a meta-element format (column **765**) and by a meta-element profile (column **764**).

C6. Scalable Template Instanciator Table

Referring now to FIG. **7F**, the ***STIT*** Table **750** corresponds to a logical simple structure made of several records **751**, each of them corresponding to a scalable

template instance, according to the preferred embodiment of the present invention. Each record includes six fields:

- The *"Address"* **752** field is used for locating the scalable template instance described by the current record **751**: its value corresponds to the conventional character string used to record the address of any range of cells.

- The *"ST"* **753** field is used for recording the name of the scalable template abided by the scalable template instance described by the current record **751**.

- The *"Element #"* **754** field is used for recording the number of elements within the scalable template instance described by the current record **751**.

- The *"Critical"* **755** field is used for recording if the scalable template instance described by the current record **751** is considered as critical. Its content can take the values "YES" or "NO".

- The *"Header Size"* **756** field is used for recording the number of meta-elements constituting the Header part of the scalable template instance described by the current record **751**.

- The *"Footer Size"* **757** field is used for recording the number of meta-elements constituting the Footer part of the scalable template instance described by the current record **751**.

C7. Scalable Template Export-Import Table

Referring now to FIG. **7G**, the ***STEIT*** Table **770** corresponds to a logical simple structure made of several records **771**, each of them corresponding to an exported scalable template item (element format or meta-element format or element profile or meta-element profile or scalable template) managed by the scalable template export manager or by the scalable template import manager, according to the preferred embodiment of the present invention. Each record includes seven fields:

- The *"Name"* **772** field is used for recording a character string which uniquely identifies the object described by the current record **771**.

- The *"Last Change Date"* **773** field is used for recording the date of the last update of the object described by the current record **771**.

- The *"Description Ptr"* **774** field is a reference pointing to the memory location where a description of the object described by the current record **771** is recorded. This memory location can either be on the Mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention.

- The *"Info Field 1"* **775** field is used for recording a first piece of information associated to the object described by the current record **771**.

- The *"Info Field 2"* **776** field is used for recording a second piece of information associated to the object described by the current record **771**.

- The *"Type"* **777** field is used for recording different attributes associated to the object described by the current record **771**, such as the attributes "META" **779**, "REFERENCED" **780**, "SELECTED" **782**, and "NATURE" **781**.
  Conventional techniques can be used for encoding these different attributes in this "*Type*" field, such as executing bit-wise XOR operations with predefined bit patterns, but any other conventional means could be used instead without departing from the spirit of the invention.

- The "*Index*" **778** field is used for scanning the ***STEIT*** table, as performed by the ***Scalable Template Export Manager*** and ***Scalable Template Import Manager*** methods.

C8. Scalable Template Instance Export-Import Table

Referring now to FIG. **7H**, the ***STIEIT*** Table **790** corresponds to a logical simple structure made of several records **791**, each of them corresponding to an exported

scalable template instance managed by the scalable template instance export manager or by the scalable template instance import manager, according to the preferred embodiment of the present invention. Each record includes five fields:

- The *"Name"* **792** field is used for recording the name of the range of cells corresponding to the exported scalable template instance described by the current record **791**.

- The *"Source File Name"* **793** field is used for recording the name of the file from which has been performed the last export operation for the exported scalable template instance described by the current record **791**.

- The *"Export Date"* **794** field is used for recording the date of the last export operation for the exported scalable template instance described by the current record **791**.

- The *"Row #"* **795** field is a reference pointing to the memory location where is recorded the ESTIT table containing the exported scalable template instance described by the current record **791**. This memory location can either be on the Mass storage **107**, or on the main memory **102**, or on other conventional memory repository means, without departing from the spirit of the present invention.

- The *"Exported STI Ptr"* **796** field is used for recording a first piece of information associated to the object described by the current record **791**.

C9. Relationships Between Tables

Referring now to FIG. **7I**, some previously introduced tables STIT **750**, STT **720**, STDT **760**, EFT **700** and EPT **710** are presented altogether to illustrate the relationships established between these tables.

- Starting with a scalable template instance **797** made of the three parts Header, Body and Footer, a first relationship is established between this scalable template instance **797** and a record **751** of the STIT table **750**.

- A second relationship is then established between this record **751** and a record **721** of the STT table **720**. This record **721** corresponds to the scalable template abided by the scalable template instance **797**.
- A third relationship is established between this record **721** and a STDT table **760** which describes the structure of the scalable template. Each record of the STDT table **760** corresponds to a pair of an element or meta-element format name and of an element or meta-element profile name.
- A fourth relationship is established between the element or meta-element format name and a record **701** of the EFT table **700**.
- A fifth relationship is established between the element or meta-element profile name and a record **711** of the EPT table **710**.
- A sixth relationship is established between the record **701** and an illustrative range of cells **798** specifying the format attributes.
- A seventh relationship is established between the record **711** and an illustrative range of cells **799** specifying the profile content.

C10. Exported Scalable Template Instance Table

Referring now to FIG. **27C**, the ***ESTIT*** Table **2740** corresponds to a logical simple structure made of several records **2741**, each of them corresponding to a row of an exported scalable template instance managed by the scalable template instance export manager or by the scalable template instance import manager, according to the preferred embodiment of the present invention. The ESTIT table can thus be seen as the range of cell which results from the disappearance of "OUT" fields from a scalable template instance. Each record includes two fields:

- The *"Field #"* **2742** field is used for recording the number of "IN" fields recorded in the range of cells corresponding to the **2743** field.

- The *"Field Content"* **2743** field is a conventional range of cells corresponding to the concatenation of the "IN" field cells for the row of the exported scalable template instance described by the current record **2741**.

D. Scenarios

In contrast to just-described conventional tools, the preferred embodiment of the present invention provides a more powerful, user-friendly and interactive approach for defining and managing scalable templates, in a form of a collection of methods.

In a preferred embodiment, the present invention is used within a scenario which articulates as a sequence of operations :

- **1. First Operation : Creation of a Scalable Template Instance**

  The first operation occurs when the spreadsheet user decides, based on some criteria not detailed here, to create a scalable template instance abiding by the structure of a scalable template. In a preferred embodiment of the present invention, this operation comprises the following steps:

  - **a. Scalable Template Manager**

    The spreadsheet user invokes first an original specific command called "***Scalable Template Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to visualise through a dedicated user interface any existing element format or meta-element format or element profile or meta-element profile or scalable template. This scalable template manager offers different alternatives for further managing these entities.

    This can be illustrated with the user interface described with the FIG **6A**, showing the Scalable Template Manager Dialog Box **600**, as displayed on the display device **106**. Within this Scalable Template Manager Dialog Box **600**, the user can visualise already defined objects (element formats, meta-element formats, element profiles, meta-element profiles and scalable templates) in the "list boxes" **613, 614** and **602** where are respectively specified the names of the objects, the types of the objects and their last date of update. If a large number of objects have been defined, then the user can navigate among them by clicking with the pointing device **105** either upwards on downwards on the scrollbar **603**, so that the objects shown within the list boxes **613, 614** and **602** move back and forth between the top object and the

bottom object. In a preferred embodiment of the present invention, the objects have been sorted by date of last update, but any other sorting scheme could be also used without departing from the spirit of the invention. Several actions may then be taken by the user.

The user can use the pointing device **105** to click on a check box on the left side of the Scalable Template Manager Dialog Box **600** like the check box **612**, in order to either select or deselect the object whose name is displayed within the list box **613** just on the right of the clicked check box. One or multiple objects can be selected or deselected. List scrolling is of course reflected on the check boxes.

Once a selection is performed, the user can use the pointing device **105** to click on the "*Delete*" push-button **607**, if he/she intends to remove all the selected objects from the list boxes **613**, **614** and **602**. If there is no other object (either scalable template or scalable template instance) referring to at least one of these objects, then they are immediately deleted, so that they do no longer appear on the list boxes **613**, **614** and **602**. Reversely if there exists at least one other scalable template or scalable template instance referring to at least one of the selected objects, then a conventional dialog box is displayed on the display device **106** to first alert the user about this situation and second to invite him to either cancel the deletion operation or to confirm it. If the user decision is to cancel the operation, then no action is taken, otherwise the selected objects are immediately deleted, so that they do no longer appear on the list boxes **613**, **614** and **602**.

Alternatively the user can use the pointing device **105** to click on the "*Edit*" push-button **611** if he/she wants to edit the selected object which is assumed to be unique.

If no object or multiple objects have been previously selected, as shown within the Scalable Template Manager Dialog Box **600** by the presence of no or multiple check marks (visible or not) within the check boxes located on the left side, like the check box **612**, then a warning message is displayed on the

display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention.

Reversely if a single object was previously selected, as shown by the presence of a single check mark (visible or not) within a check box located on the left side, like the check box **612**, then the Scalable Template Manager Dialog Box **600** is first closed and afterwards the nature of this single selected object is taken into account to determine the new dialog box to be opened.

If the selected object was an element format or a meta-element format, then the ***Element Format Editor*** command is issued, so that the ***Element Format Editor*** method takes control by first displaying on the display device **106** the Element Format Editor Dialog Box **621**, as illustrated in FIG **6B**. The following steps of this scenario case are detailed in a subsequent section.

If the selected object was an element profile or a meta-element profile, then the ***Element Profile Editor*** command is issued, so that the ***Element Profile Editor*** method takes control by first displaying on the display device **106** the Element Profile Editor Dialog Box **641**, as illustrated in FIG **6C**. The following steps of this scenario case are detailed in a subsequent section.

If the selected object was a scalable template, then the ***Scalable Template Editor*** command is issued, so that the ***Scalable Template Editor*** method takes control by first displaying on the display device **106** the Scalable Template Editor Dialog Box **661**, as illustrated in FIG **6D**. The following steps of this scenario case are detailed in a subsequent section.

Alternatively the user can use the pointing device **105** to click on the "*Instanciate*" push-button **604** if he/she wants to generate a scalable template instance which abides by the selected object which is assumed to be unique and to be a scalable template.

If no object or multiple objects have been previously selected, as shown within the Scalable Template Manager Dialog Box **600** by the presence of no or multiple check marks (visible or not) within the check boxes located on the left side, like the check box **612**, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up

windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention.

Reversely if a single object was previously selected, as shown by the presence of a single check mark (visible or not) within a check box located on the left side, like the check box **612**, then the method checks if this object is a scalable template.

If it is not the case, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention.

Reversely if a single scalable template object was previously selected, then the Scalable Template Manager Dialog Box **600** is first closed and afterwards the ***Scalable Template Instanciator*** command is issued, so that the ***Scalable Template Instanciator*** method takes control by first displaying on the display device **106** the Scalable Template Instanciator Dialog Box **1300**, as illustrated in FIG **13A**. The following steps of this scenario case are detailed in a subsequent section.

Alternatively the user can use the pointing device **105** to click on the "*Export*" push-button **606** if he/she wants to export a non-empty set of objects from the current spreadsheet file to another spreadsheet file.

If no object has been previously selected, as shown within the Scalable Template Manager Dialog Box **600** by the absence of any check mark (visible or not) within the check boxes located on the left side, like the check box **612**, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention.

Reversely if one or multiple objects were previously selected, as shown by the presence of at least one check mark (visible or not) within a check box located on the left side, like the check box **612**, then the Scalable Template Manager Dialog Box **600** is first closed and afterwards the ***Scalable Template Export Manager*** command is issued, so that the ***Scalable***

Template Export Manager method takes control by first displaying on the display device **106** the Scalable Template Export Manager Dialog Box **2600**, as illustrated in FIG **26A**. The following steps of this scenario case are detailed in a subsequent section.

Alternatively the user can use the pointing device **105** to click on the "*Import*" push-button **605** if he/she wants to import one or several objects from another spreadsheet file to the current spreadsheet file. The Scalable Template Manager Dialog Box **600** is first closed and afterwards the ***Scalable Template Import Manager*** command is issued, so that the ***Scalable Template Import Manager*** method takes control by first displaying on the display device **106** the Scalable Template Import Manager Dialog Box **2620**, as illustrated in FIG **26B**. The following steps of this scenario case are detailed in a subsequent section.

Alternatively the user can use the pointing device **105** to click on one of the three option-buttons on the bottom left side of the Scalable Template Manager Dialog Box **600**, like the "*Profile*" option-button **609**, if he/she wants to specify which type of new object may be created afterwards. As three option-buttons are available on the Scalable Template Manager Dialog Box **600**, the user has the choice to specify either a format, or a profile or a scalable template as the type of the new object to be created afterwards.

Alternatively the user can use the pointing device **105** to click on the check-box **608** entitled "*From current selection*", if he/she wants to specify if the next object to be created afterwards will be derived or not from the range of cells currently selected in the spreadsheet file.

Alternatively the user can use the pointing device **105** to click on the "*Create New*" push-button **610** if he/she wants to create a new object whose type has been previously specified thanks to the three option-buttons like

- the "*Profile*" option-button **609**, or
- the "*Format*" option-button **617**, or

- the "*Template*" option-button **616**.

If none of these three option-buttons shows a previous user choice, as shown within the Scalable Template Manager Dialog Box **600** by the absence of a point within one of these three option-buttons **609**, **616** and **617**, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention.

Reversely if one of these three option-buttons **609**, **616** and **617** shows a previous user choice, then the Scalable Template Manager Dialog Box **600** is first closed and afterwards the single selected option-button is taken into account to determine the new dialog box to be opened.

If the "*Format*" option-button **617** shows a selection, then the ***Element Format Editor*** command is issued, so that the ***Element Format Editor*** method takes control by first displaying on the display device **106** the Element Format Editor Dialog Box **621**, as illustrated in FIG **6B**. The following steps of this scenario case are detailed in a subsequent section.

If the "*Profile*" option-button **609** shows a selection, then the ***Element Profile Editor*** command is issued, so that the ***Element Profile Editor*** method takes control by first displaying on the display device **106** the Element Profile Editor Dialog Box **641**, as illustrated in FIG **6C**. The following steps of this scenario case are detailed in a subsequent section.

If the "*Template*" option-button **616** shows a selection, then the ***Scalable Template Editor*** command is issued, so that the ***Scalable Template Editor*** method takes control by first displaying on the display device **106** the Scalable Template Editor Dialog Box **661**, as illustrated in FIG **6D**. The following steps of this scenario case are detailed in a subsequent section.

Finally the user can use the pointing device **105** to click on the "*Done*" push-button **601** or on the closing-window push-button **615** if he/she wants to quit the Scalable template Manager method. The resulting effect is to close the Scalable Template Manager Dialog Box **600** on the display device **106**.

- **b. Element Format Editor**

According to the previous scenario illustrating the ***Scalable Template Manager*** method, the spreadsheet user may then invoke an original specific command called "***Element Format Editor***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order

- to either create a new element format; or
- to create a new meta-element format; or
- to update an existing element format; or
- to update an existing meta-element format.

This can be illustrated with the user interface described with the FIG **6B**, showing the Element Format Editor Dialog Box **621**, as displayed on the display device **106** within the GUI window **620** of the electronic spreadsheet office application. When the Element Format Editor Dialog Box **621** is displayed on the display device **106**, the current sheet becomes a dedicated sheet entitled "*Editor Space*" **635** in a preferred embodiment of the present invention. Within the "*Editor Space*" **635** sheet, the element or meta-element format to be edited appears as a range of cells **634** in the top left angle of the window **620**, with the top left cell at address B2. As the element or meta-element format corresponds to a regular range of cells **634** within a sheet, the conventional tools available in electronic spreadsheet environments can be used to update it. This is illustrated for instance with the Range Properties Dialog Box **633** which is used here to specify that the second cell of the element format has an horizontal alignment set to center, has a vertical alignment set to bottom, without text alignment across columns, without text wrapping in cells and finally with a natural orientation. Any other conventional format attribute could in turn be specified with conventional means.

When the Element Format Editor Dialog Box **621** is displayed on the display device **106**, it contains some pieces of information.

First the nature of the edited object is shown by a pair of option-buttons **630** which specifies if it is either an element format or a meta-element format. The spreadsheet user can click with the pointing device **105** on one of these two option-buttons **630** to swap between an element format definition and a meta-element format definition.

Second the number of cells within the edited object is specified in the text-box **626**. When a new element format or meta-element format is created from the currently selected range of cells (the spreadsheet user having previously clicked with the pointing device **105** on the check box **608** to put a check mark on it, on the option-button **617** to put a point on it and on the push-button **610**, all contained within the Scalable Template Manager Dialog Box **600** as illustrated by FIG **6A**), the value shown by the text box **626** corresponds to the numbers of cells found in the currently selected range of cells. When a new element format or meta-element format is created regardless of the currently selected range of cells (the spreadsheet user having previously clicked with the pointing device **105** on the check box **608** to clear it, on the option-button **617** to put a point on it and on the push-button **610**, all contained within the Scalable Template Manager Dialog Box **600**), the value shown by the text box **626** corresponds to a default value set to 8 in a preferred embodiment of the present invention. When an existing element format or meta-element format is edited, the value shown by the text box **626** corresponds to the number of cells previously defined for this object. In all cases, the spreadsheet user can change the value shown in the text box **626** by clicking with the pointing device **105** on the spin-button **627**, either on the ascending or on the descending side, so that the value can get increased or decreased (within predefined boundaries).

Third the name of the edited element format or meta-element format is displayed on the label box **624**. When an existing element format or meta-element format is edited, the name shown by the label box **624** corresponds to the name previously assigned to this object. When a new

element format or meta-element format is created, then the name displayed on the label box **624** corresponds to a default value which, in a preferred embodiment of the present invention, takes the form "New XX" where XX is a counter ensuring the uniqueness of the assigned name.

The Element Format Editor Dialog Box **621** contains several graphical objects which allow the spreadsheet user to take some actions.

First the spreadsheet user can assign a new name to the currently edited element format or meta-element format. For this purpose he/she will first use conventional means such as the keyboard **104** to specify within the text box **625** the new name to be given to the edited element or meta-element format. Then he/she will use the pointing device **105** to click on the "*Save As*" push-button **631**. If the specified name entered within the text box **625** was already assigned to an existing object or is not a valid name, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation and then prompts him for acknowledgement. Then the text box **625** is cleared without further action. If the specified name entered within the text box **625** was not yet assigned to an existing object and was a valid name, then the text box **625** is cleared and the edited object is saved on the spreadsheet file under the new name which is in turn displayed within the label box **624**.

Second the spreadsheet user can clear the current element or meta-element format definition by clicking with the pointing device **105** on the "*Clear*" push-button **629**. The resulting effect is to assign to the edited object shown by the range **634** all the default attributes currently defined within the opened spreadsheet file (these attributes being for instance the ones set by default when a new sheet is created within the electronic spreadsheet file).

Third the spreadsheet user can save on the spreadsheet file the current definition of the edited object by clicking with the pointing device **105** on the "*Save*" push-button **632**. This event results in checking if the updated element of meta-element format is already referenced by an existing scalable template. If it is not the case, then the updated definition of the element or meta-element format, as described by the illustrative range of cells **634**, is saved on the spreadsheet file. If it is the case, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation and then prompts him for either cancelling the operation or for pursuing it. In the first case the updated element or meta-element format definition, as described by the illustrative range of cells **634**, is not saved while it is saved on the spreadsheet file in the second case.

Fourth the spreadsheet user can apply any updated element or meta-element format definition onto any existing scalable template instance abiding by a scalable template which refers to the updated format. For this purpose he/she use the pointing device **105** to click on the "*Save & Refresh*" push-button **628**. The result effect is first that the element or meta-element format definition gets saved on the spreadsheet file and then that every existing scalable template instance which abides by any scalable template which refers to the updated element or meta-element format will be in turn updated to reflect the element or meta-element format definition change.

Finally the user can use the pointing device **105** to click on the "*Done*" push-button **623** or on the closing-window push-button **622** if he/she wants to quit the Element Format Editor method. The resulting effect is to close the Element Format Editor Dialog Box **621** on the display device **106** and to revert to the sheet which was active when the ***Element Format Editor*** command was first invoked.

- **c. Element Profile Editor**

According to the previous scenario illustrating the ***Scalable Template Manager*** method, the spreadsheet user may then invoke an original specific command called "***Element Profile Editor***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to either create a new element profile or to create a new meta-element profile or to update an existing element profile or to update an existing meta-element profile.

This can be illustrated with the user interface described with the FIG **6C**, showing the Element Profile Editor Dialog Box **641**, as displayed on the display device **106** within the GUI window **640** of the electronic spreadsheet office application. When the Element Profile Editor Dialog Box **641** is displayed on the display device **106**, the current sheet becomes a dedicated sheet entitled "*Editor Space*" **655** in a preferred embodiment of the present invention. Within the "*Editor Space*" **655** sheet, the element or meta-element profile to be edited appears as a range of cells **654** in the top left angle, with the top left cell at address B2. As the element or meta-element profile corresponds to a regular range of cells **654** within a sheet, the conventional tools available in electronic spreadsheet environments can be used to update it. This will typically consist in updating the content of any cell belonging to the edited element profile or meta-element profile. As far as the "IN" or "OUT" nature of each cell is concerned, this information is recorded in a preferred embodiment of the present invention by the cell protection mode attribute: a cell specified as not protected from changes corresponds to an "IN" cell whereas a cell specified as protected from changes corresponds to an "OUT" cell. This is illustrated for instance with the Range Properties Dialog Box **653** which is used here to specify that the second cell of the element profile is protected from cell contents, meaning that it is considered as an "OUT" cell. Any other conventional cell attribute could be used instead of the cell protection mode attribute without departing from the spirit of the present

invention.

When the Element Profile Editor Dialog Box **641** is displayed on the display device **106**, it contains some pieces of information.

First the nature of the edited object is shown by a pair of option-buttons **650** which specifies if it is either an element profile or a meta-element profile. The spreadsheet user can click with the pointing device **105** on one of these two option-buttons **650** to swap between an element profile definition and a meta-element profile definition.

Second the number of cells within the edited object is specified in the text-box **646**. When a new element profile or meta-element profile is created from the currently selected range of cells (the spreadsheet user having previously clicked with the pointing device **105** on the check box **608** to put a check mark on it, on the option-button **609** to put a point on it and on the push-button **610**, all contained within the Scalable Template Manager Dialog Box **600**, as illustrated by FIG **6A**), the value shown by the text box **646** corresponds to the numbers of cells found in the currently selected range of cells. When a new element profile or meta-element profile is created regardless of the currently selected range of cells (the spreadsheet user having previously clicked with the pointing device **105** on the check box **608** to clear it, on the option-button **609** to put a point on it and on the push-button **610**, all contained within the Scalable Template Manager Dialog Box **600**, as illustrated by FIG **6A**), the value shown by the text box **646** corresponds to a default value set to 8 in a preferred embodiment of the present invention. When an existing element profile or meta-element profile is edited, the value shown by the text box **646** corresponds to the number of cells previously defined for this object. In all cases, the spreadsheet user can change the value shown in the text box **646** by clicking with the pointing device **105** on the spin-button **647**, either on the ascending or on the descending side, so that the value can get increased or decreased (within predefined boundaries).

Third the name of the edited element profile or meta-element profile is displayed on the label box **644**. When an existing element profile or meta-element profile is edited, the name shown by the label box **644** corresponds to the name previously assigned to this object. When a new element profile or meta-element profile is created, then the name displayed on the label box **644** corresponds to a default value which, in a preferred embodiment of the present invention, takes the form "New XX" where XX is a counter ensuring the uniqueness of the assigned name.

The Element Profile Editor Dialog Box **641** contains several graphical objects which allow the spreadsheet user to take some actions.

First the spreadsheet user can assign a new name to the currently edited element profile or meta-element profile. For this purpose he/she will first use conventional means such as the keyboard **104** to specify within the text box **645** the new name to be given to the edited element or meta-element profile. Then he/she will use the pointing device **105** to click on the "*Save As*" push-button **651**. If the specified name entered within the text box **645** was already assigned to an existing object or was not a valid name, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation and then prompts him for acknowledgement. Then the text box **645** is cleared without further action. If the specified name entered within the text box **645** was not yet assigned to an existing object and was a valid name, then the text box **645** is cleared and the edited object is saved on the spreadsheet file under the new name which is in turn displayed within the label box **644**.

Second the spreadsheet user can clear the current element or meta-element profile definition by clicking with the pointing device **105** on the "*Clear*" push-button **649**. The resulting effect is to assign to the edited object shown

by the range **654** the default content currently defined within the opened spreadsheet file (this content being for instance the one set by default when a new sheet is created within the electronic spreadsheet file, most often a "void" content).

Third the spreadsheet user can save on the spreadsheet file the current definition of the edited object by clicking with the pointing device **105** on the "*Save*" push-button **652**. This event results in checking if the updated element or meta-element profile is already referenced by an existing scalable template. If it is not the case, then the updated definition of the element or meta-element profile is saved on the spreadsheet file. If it is the case, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation and then prompts him for either cancelling the operation or for pursuing it. In the first case the updated element or meta-element profile definition is not saved while it is saved on the spreadsheet file in the second case.

Fourth the spreadsheet user can apply any updated element or meta-element profile definition onto any existing scalable template instance abiding by a scalable template which refers to the updated profile. For this purpose he/she use the pointing device **105** to click on the "*Save & Refresh*" push-button **648**. The result effect is first that the element or meta-element profile definition gets saved on the spreadsheet file and then that every existing scalable template instance which abides by any scalable template which refers to the updated element or meta-element profile will be in turn updated to reflect the element or meta-element profile definition change.

Finally the user can use the pointing device **105** to click on the "*Done*" push-button **643** or on the closing-window push-button **642** if he/she wants to quit the Element Profile Editor method. The resulting effect is to close the

Element Profile Editor Dialog Box **641** on the display device **106** and to revert to the sheet which was active when the ***Element Profile Editor*** command was first invoked.

- **d. Scalable Template Editor**

According to the previous scenario illustrating the ***Scalable Template Manager*** method, the spreadsheet user may then invoke an original specific command called "***Scalable Template Editor***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to either create a new scalable template or to update an existing scalable template.

This can be illustrated with the user interface described with the FIG **6D**, showing the Scalable Template Editor Dialog Box **661**, as displayed on the display device **106** within the GUI window **660** of the electronic spreadsheet office application. When the Scalable Template Editor Dialog Box **661** is displayed on the display device **106**, the current sheet becomes a dedicated sheet entitled "*Editor Space*" **675** in a preferred embodiment of the present invention. Within the "*Editor Space*" **675** sheet, the scalable template to be edited appears as a range of cells **674** in the top left angle, with the top left cell at address B2. Although the edited scalable template corresponds to a regular range of cells **674** within a sheet, conventional tools available in electronic spreadsheet environments cannot be used to update this range of cells **674**. The spreadsheet user will only be able to navigate within the range of cells **674** illustrating the scalable template, and to either insert or delete rows within the range of cells **674** illustrating the scalable template, by using dedicated means which are part of the Scalable Template Editor Dialog Box **661**. Row insertion or deletion in the "*Editor Space*" sheet **675** will be disabled. Moreover the "*Editor Space*" sheet **675** is write-protected to prevent the user to inadvertently modify the settings of the elements or meta-elements defined as part of the scalable template illustrated by the range of cells **674**.

When the Scalable Template Editor Dialog Box **661** is displayed on the display device **106**, it contains some pieces of information which either relate to the whole scalable template, as illustrated by the range of cells **674**, or which relate to the element or meta-element pointed by the cell currently selected within this same range of cells **674**.

First the format of the element or meta-element pointed by the cell currently selected is shown by the "*Format*" combo box **671**. By clicking with the pointing device **105** on the arrow located on the right side of this "*Format*" combo box **671**, the spreadsheet user can display and navigate within the list of defined formats, then select a format of his/her choice and see the resulting visible effect on the row where is located the currently selected cell within the range of cells **674**. Similarly the profile of the element or meta-element pointed by the cell currently selected is shown by the "*Profile*" combo box **670**. By clicking with the pointing device **105** on the arrow located on the right side of this "*Profile*" combo box **670**, the spreadsheet user can display and navigate within the list of defined profiles, then select a profile of his/her choice and see the resulting visible effect on the row where is located the currently selected cell within the range of cells **674**. Reversely, if the spreadsheet user changes the selected row within the range of cells **674**, by clicking with the pointing device **105** on the "*Up*" push-button **679**, or on the "*Down*" push-button **680**, then the names displayed within the combo boxes **671** and **670** are updated to respectively specify the name of the format and of the profile of the element or meta-element corresponding to the new selected row. If the spreadsheet user wishes to insert a new meta-element either in the header or in the footer part of the scalable template, he/she has just to click with the pointing device **105** on the "*Add*" push-button **677** to insert a new row within the range of cells **674**, at the desired place above the last position of the currently selected cell. Then the range of cells **674** is updated with a new row being displayed on the window **660**. Then the Scalable Template Editor Dialog Box **661** is updated by showing within the respective combo boxes **671** and **670** the names of the format and profile

assigned by default to the introduced meta-element. If the spreadsheet user wishes to remove a meta-element either from the header part or from the footer part of the scalable template, he/she has just to click with the pointing device **105** on the "*Delete*" push-button **678** to remove the corresponding row within the range of cells **674**, at the desired place. Then the currently selected cell within the range of cells **674** becomes the left cell belonging to the row representing the unique element defined within the scalable template, and the Scalable Template Editor Dialog Box **661** is updated by showing within the respective combo boxes **671** and **670** the names of the format and profile of the unique element defined within the scalable template.

Second the minimum number of elements allowed within a scalable template instance abiding by the edited scalable template is specified in the "*MIN*" text-box **666**. Similarly the maximum number of elements allowed within a scalable template instance abiding by the edited scalable template is specified in the "*MAX*" text-box **669.** When a new scalable template is created (the spreadsheet user having previously clicked with the pointing device **105** on the option-button **616** to put a point on it and on the push-button **610**, all contained within the Scalable Template Manager Dialog Box **600**, as illustrated by FIG **6A**), the value shown by the "*MIN*" text box **666** corresponds to a default value set to 1 in a preferred embodiment of the present invention, and the value shown by the "*MAX*" text box **669** corresponds to a default value set to 255 in a preferred embodiment of the present invention. When an existing scalable template is edited, the values shown by the text boxes **666** and **669** correspond respectively to the minimum and maximum number of elements allowed in any scalable template instance abiding by the currently edited scalable template, as previously defined by the spreadsheet user. In all cases, the spreadsheet user can change the values shown in the text box "*MIN*" **666** or in the text box "*MAX*" **669** by clicking with the pointing device **105** respectively on the spin-button **667** or on the spin-button **668**, either on the ascending or on the descending side, so that the values can get increased or decreased (within predefined boundaries), while ensuring that the value specified in the "*MIN*" text box **666** remains less than or equal to the

value specified in the "*MAX*" text box **669**. Should any existing scalable template instance abiding by the updated scalable template have a number of elements falling outside the new "*MIN*"-"*MAX*" interval, then this instance will not be impacted by the scalable template update, but any future addition or removal of elements will be done according to the new definition of the "*MIN*"-"*MAX*" interval.

Third the name of the edited scalable template is displayed on the label box **664**. When an existing scalable template is edited, the name shown by the label box **664** corresponds to the name previously assigned to this object. When a new scalable template is created, then the name displayed on the label box **664** corresponds to a default value which, in a preferred embodiment of the present invention, takes the form "New XX" where XX is a counter ensuring the uniqueness of the assigned name.

The Scalable Template Editor Dialog Box **661** comprises several graphical objects which allow the spreadsheet user to take some actions.

First the spreadsheet user can assign a new name to the currently edited scalable template, if this scalable template is currently constituted by element formats, element profiles, meta-element formats and meta-element profiles having all the same number of fields. Indeed in this case the "*Save As*" push-button **672** is enabled, so that any click on it with the pointing device **105** is recognised as a valid event. The spreadsheet user will first use conventional means such as the keyboard **104** to specify within the text box **665** the new name to be given to the edited scalable template. Then he/she will use the pointing device **105** to click on the "*Save As*" push-button **672**. If the specified name entered within the text box **665** was already assigned to an existing object or is not a valid name, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this

situation and then prompts her/him for acknowledgement. Then the text box **665** is cleared without further action. If the specified name entered within the text box **665** was not yet assigned to an existing object and is a valid name, then the text box **665** is cleared and the edited scalable template is saved on the spreadsheet file under the new name which is in turn displayed within the label box **664**.

Second the spreadsheet user can save on the spreadsheet file the current definition of the edited scalable template, if this scalable template is currently constituted by element formats, element profiles, meta-element formats and meta-element profiles having all the same number of fields. Indeed in this case the "*Save*" push-button **673** is enabled, so that any click on it with the pointing device **105** is recognised as a valid event. This event results in checking if the updated scalable template is already referenced by an existing scalable template instance. If it is not the case, then the updated definition of the scalable template is saved on the spreadsheet file. If it is the case, then a warning message is displayed on the display device **106** to the user through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation and then prompts him for either cancelling the operation or for pursuing it. In the first case the updated scalable template definition is not saved while it is saved on the spreadsheet file in the second case.

Finally the user can use the pointing device **105** to click on the "*Done*" push-button **663** or on the closing-window push-button **662** if he/she wants to quit the Scalable Template Editor method. The resulting effect is to close the Scalable Template Editor Dialog Box **661** on the display device **106** and to revert to the sheet which was active when the ***Element Profile Editor*** command was first invoked.

- **e. Scalable Template Instanciator**

  According to the previous scenario illustrating the ***Scalable Template Manager*** method, the spreadsheet user may then invoke an original specific command called "***Scalable Template Instanciator***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to create a scalable template instance abiding by a selected scalable template and located according to the currently selected cell.

  This can be illustrated with the user interface described with the FIG **13A**, showing the Scalable Template Instanciator Dialog Box **1300**, as displayed on the display device **106**. When the Scalable Template Instanciator Dialog Box **1300** is displayed on the display device **106**, the current sheet remains still active, so that the spreadsheet user can visualise the data present on it. The Scalable Template Instanciator Dialog Box **1300** contains some pieces of information which relate to the instanciation operation.

  First the name of the scalable template that abides by the scalable template instance to be created, is displayed in a label box **1315**.

  Second the number of elements to be present at instance creation time is shown in a text box **1312**. This number takes a default value equal to 8 (eight) in a preferred embodiment of the present invention. If the spreadsheet user wished to create a scalable template instance with another number of elements, then he/she will have to click with the pointing device **105** on the upper or lower side of the spin-button **1313** to either increase or decrease the number of elements. This number of elements will vary within a range delimited by the minimum and maximum number of elements, as specified within the definition of the scalable template (fields "*Min Element #*" **725** and "*Max Element #*" **726** within a record **721** of the STT table **720** whose "*Name*" field **722** matches the name displayed in the label box **1315**) and is displayed, after possible update, in the text box **1312**.

Third the mode of the instanciation is specified by the presence of a black point within one of the five option buttons "*Overlay*" **1309**, "*Horizontal Insert*" **1308**, "*Horizontal Insert by Range*" **1307**, "*Vertical Insert*" **1306** and "*Vertical Insert by Range*" **1305**. If the spreadsheet user wishes to change the default mode of instanciation which is "*Overlay*" or a previously changed mode of instanciation, then he/she uses the pointing device **105** to click on one of the five option buttons "*Overlay*" **1309**, "*Horizontal Insert*" **1308**, "*Horizontal Insert by Range*" **1307**, "*Vertical Insert*" **1306** and "*Vertical Insert by Range*" **1305** which will display alone a black point specifying the new selected mode of instanciation.

Fourth the check box **1314** allows the spreadsheet user to specify if the new scalable template instance is considered or not as a "*Critical*" instance. If and only if the check box **1314** displays a check mark, then the scalable template instance will be created as a critical one. By clicking with the pointing device **105** on this check box **1314**, the spreadsheet user can swap between a "*Critical*" and not "*Critical*" instance, which is reflected by the presence or absence of a check mark within this same check box **1314**.

Fifth the push-button "*Cancel*" **1302** or the closing-window push-button **1301** allow to close the Scalable Template Instanciation Dialog Box **1300** without further action. By clicking with the pointing device **105** on one of these two push-buttons **1301** and **1302**, the Scalable Template Instanciation Dialog Box **1300** is closed and the scalable template instanciation operation is aborted.

Sixth the push-button "*Create*" **1303**, when first enabled and second clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of scalable template instanciation. This push-button "*Create*" **1303** is enabled (meaning that the method recognises the click event with the pointing device on this push-button "*Create*" **1303**) when the instanciation operation is possible. The fact that this scalable template instanciation is possible or not depends on different factors: the position of the currently selected cell within the current sheet of the electronic spreadsheet, the size of

the scalable template to be created, the mode of instanciation, the presence of any existing critical scalable template instance which would be corrupted due to the new instance creation. The possibility to create or not a new scalable template instance with the size specified in the text box **1312**, abiding by a scalable template whose name is specified by the label box **1315**, with the top left corner located on the currently selected cell, and according to the mode of instanciation specified by one of the five option buttons **1305, 1306, 1307, 1308** and **1309**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Instanciation Dialog Box **1300**: the label box **1310** which reflects if the new scalable template instance is or not too high, the label box **1311** which reflects if the new scalable template instance is or not too wide, and the set of 15 label boxes **1304** which are organised as a matrix of 5 rows by 3 columns and which reflect for each possible mode of instanciation (one per row) if the creation of the new scalable template instance may lead to corrupt any existing critical scalable template instance (first column), or may lead to corrupt any other existing scalable template instance or may lead to loose any existing data present in one or several spreadsheet cells. As soon as the value "YES" is taken by the label box **1310**, or by the label box **1311**, or by the **1304** label box located at the intersection of the leftmost column and of the row corresponding to the selected mode of instanciation, then the instance creation is considered as impossible, so that the "*Create*" push-button **1303** get disabled. Reversely, if the value "NO" is displayed in these three label boxes, then the instanciation operation is possible, so that the "*Create*" push-button **1303** get enabled. When clicked with the pointing device **105** by the spreadsheet user, the instanciation operation is performed, and then the Scalable Template Instanciation Dialog Box **1300** is closed.

The way the creation of a new scalable template instance may corrupt an existing scalable template instance or may lead to loose any data present in a cell is illustrated for each mode of instanciation by the FIG **13B, 13C, 13D, 13E, 13F** and **13G.**

Referring first to the FIG **13B**, one can see an illustration of the current sheet **1320** before the instanciation operation is triggered. This sheet is first characterised by its number of columns *STI_sheet_width* **1321** and by its number of rows *STI_sheet_height* **1322**. Within this current sheet, the currently selected cell **1327** is also characterised by its row offset number *STI_offset_height* **1324** and by its column offset number *STI_offset_width* **1323**. The new scalable template instance to be created will correspond to a range of cells *STI_range* **1328** which is itself characterised by a number of rows *STI_height* **1326** and by a number of columns *STI_width* **1325**. Four other ranges of cells can now be identified within the current sheet **1320**: the range of cells *STI_horizontal_flushed_range* **1330** which is located on the same rows than the range of cells *STI_range* **1328**, but in the *STI_width* **1325** rightmost columns; the range of cells *STI_vertical_flushed_range* **1332** which is located on the same columns than the range of cells *STI_range* **1328**, but in the *STI_height* **1326** bottom rows; the range of cells *STI_horizontal_kept_range* **1329** located between the ranges of cells *STI_range* **1328** and *STI_horizontal_flushed_range* **1330**; and the range of cells *STI_vertical_kept_range* **1331** located between the ranges of cells *STI_range* **1328** and *STI_vertical_flushed_range* **1332**. Finally the FIG **13B** also shows 6 existing scalable template instances: the ranges of cells *STI_horizontal_cut_instance* **1333**, *STI_vertical_cut_instance* **1334**, *STI_horizontal_sheared_instance* **1335**, *STI_vertical_sheared_instance* **1336**, *STI_vertical_flushed_instance* **1337**, *STI_horizontal_flushed_instance* **1338**.

Referring now to FIG **13C**, the "OVERLAY" mode is illustrated as the new instance is created as the range of cells **1341** within the updated current sheet **1340**. The instanciation operation consists here in replacing the former range of cells *STI_range* **1328** by the new instance. The previously existing scalable template instance *STI_vertical_cut_instance* **1334** is corrupted as its top right corner has been overwritten by the newly created instance: only the shape **1342** has been left untouched by the instanciation operation. If this

previously existing scalable template instance *STI_vertical_cut_instance* **1334** was a critical one, then the instanciation operation would have been considered as impossible (push-button "*Create*" **1303** being disabled). If this previously existing scalable template instance *STI_vertical_cut_instance* **1334** was not a critical one, then the instanciation operation would have been considered as possible (push-button "*Create*" **1303** being enabled), but the range of cells *STI_vertical_cut_instance* **1334** would no longer be considered as an instance.

Referring now to FIG **13D**, the "HORIZONTAL INSERT" mode is illustrated as the new instance is created as the range of cells **1351** within the updated current sheet **1350**. With this mode, a number of rows **1356** equal to *STI_height* **1326** is first inserted at the position occupied by the currently selected cell **1327**, then the new scalable template instance **1351** is created with the top left cell located on the currently selected cell **1327**. The insertion of the new rows may have some impact on existing instances. First any instance like the *STI_horizontal_cut_instance* **1333** (which crossed the row of the currently selected cell **1327**) is cut into two pieces: the top piece **1352** which was located above the row of the currently selected cell **1327** and the bottom piece **1353** which was located below the row of the currently selected cell **1327**. Second any instance like the *STI_vertical_flushed_instance* **1337** (which was overlapping the last *STI_height* **1326** rows) is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) **1354** remains within the limits of the current sheet **1350**. Third any data previously located within the last *STI_height* **1326** rows is now pushed away from the current sheet **1350** in an area **1355**. As previously explained, if one of the corrupted existing instance is a critical instance, then the instanciation operation would be considered as impossible, so that the "*Create*" push-button **1303** remains disabled. Otherwise the instanciation operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **13E**, the "VERTICAL INSERT" mode is illustrated as the new

instance is created as the range of cells **1361** within the updated current sheet **1360**. With this mode, a number of columns **1365** equal to *STI_width* **1325** is first inserted at the position occupied by the currently selected cell **1327**, then the new scalable template instance **1361** is created with the top left cell located on the currently selected cell **1327**. The insertion of the new columns may have some impact on existing instances. First any instance like the *STI_vertical_cut_instance* **1334** (which crossed the column of the currently selected cell **1327**) is cut into two pieces: the left piece **1362** which was located on the left of the column of the currently selected cell **1327** and the right piece **1363** which was located on the right of the column of the currently selected cell **1327**. Second any instance like the *STI_horizontal_flushed_instance* **1338** (which was overlapping the last *STI_width* **1325** columns) is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) **1364** remains within the limits of the current sheet **1360**. Third any data previously located within the rightmost *STI_width* **1325** columns is now pushed away from the current sheet **1360** in an area **1366**. As previously explained, if one of the corrupted existing instance is a critical instance, then the instanciation operation would be considered as impossible, so that the "*Create*" push-button **1303** remains disabled. Otherwise the instanciation operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **13F**, the "HORIZONTAL INSERT BY RANGE" mode is illustrated as the new instance is created as the range of cells **1371** within the updated current sheet **1370**. With this mode, the two ranges of cells *STI_range* **1328** and *STI_vertical_kept_range* **1331** are moved down by a number of rows equal to *STI_height* **1326**, so that space is left available for the new instance **1371**, and so that the bottom range of cells *STI_vertical_flushed_range* **1332** is moved away from the limits of the current sheet **1370** in an area **1376**. The range move may have some impact on existing instances. First any instance like the *STI_vertical_cut_instance* **1334** and the

STI_vertical_sheared_instance **1336** (which partially overlapped the two ranges of cells **1328** and **1331** moved down) are sheared into two pieces: the left pieces **1372** and **1375** and the right pieces **1373** and **1374**. Second any instance which was overlapping the range of cells *STI_vertical_flushed_range* **1332** is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) remains within the limits of the current sheet **1370**. Third any data previously located within the range of cells *STI_vertical_flushed_range* **1332** is now pushed away from the current sheet **1370** in an area **1376**. As previously explained, if one of the corrupted existing instance is a critical instance, then the instanciation operation would be considered as impossible, so that the "*Create*" push-button **1303** remains disabled. Otherwise the instanciation operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **13G**, the "VERTICAL INSERT BY RANGE" mode is illustrated as the new instance is created as the range of cells **1381** within the updated current sheet **1380**. With this mode, the two ranges of cells *STI_range* **1328** and *STI_horizontal_kept_range* **1329** are moved right by a number of columns equal to *STI_width* **1325**, so that space is left available for the new instance **1381**, and so that the rightmost range of cells *STI_horizontal_flushed_range* **1330** is moved away from the limits of the current sheet **1370** in an area **1388**. The range move may have some impact on existing instances. First any instance like the *STI_horizontal_cut_instance* **1333**, the *STI_vertical_cut_instance* **1334**, and the *STI_horizontal_sheared_instance* **1335** (which partially overlapped the two ranges of cells **1328** and **1329** moved rights) are sheared into two pieces: the top pieces **1383, 1384** and **1387** and the bottom pieces **1382, 1385** and **1386**. Second any instance which was overlapping the range of cells *STI_horizontal_flushed_range* **1330** is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) remains within the limits of the current sheet **1380**. Third any data previously located within the range of cells *STI_horizontal_flushed_range* **1330** is now pushed away from

the current sheet **1380** in an area **1388**. As previously explained, if one of the corrupted existing instance is a critical instance, then the instanciation operation would be considered as impossible, so that the "*Create*" push-button **1303** remains disabled. Otherwise the instanciation operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

- **2. Second Operation : Introduction of New Elements Within a Defined Scalable Template Instance**

The second operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to introduce new elements within a defined scalable template instance. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first selects a range of cell of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104.**

- **b. Scalable Template Instance Insertion Manager**

Then the spreadsheet user invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to) dedicated push-buttons, keyboard entry short cuts, menu or sub-menu entries, an original specific command called "***Scalable Template Instance Insertion Manager***" which enriches the conventional means for inserting cells or rows within a spreadsheet. In a preferred embodiment of the present invention, the ***"Scalable Template Instance Insertion Manager"*** command is invoked by using the same set of means as the ones available in conventional electronic spreadsheets for inserting a range of cells within a sheet, such as but not limited to clicking with the pointing device **105** on a "Insert" sub-menu entry of the "Range" menu entry, or keying the "Ctrl +" key on the keyboard **104.**

When the command is invoked, a test is first performed to determine if the currently selected cell belongs or not to an existing scalable template instance.

If it is the case, then a second test is performed to determine the relative position of the currently selected cell within this scalable template instance, which will be referred to as the current scalable template instance.

If the currently selected cell is found within the header part of within the footer part of the current scalable template instance, then the insertion operation will certainly corrupt this instance. To this effect a warning message is issued on the display device **106** through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this case, and the spreadsheet user is then invited through conventional prompting means such as a dialog box with "*Cancel*" and "*Continue*" push-buttons, or through any other similar conventional means which can be used instead without departing from the spirit of the invention, to either cancel the insertion operation, or to continue it, meaning that the current scalable template instance will loose its instance nature.

If the spreadsheet user decision is to cancel the insertion operation, then the warning and prompting means disappear from the display device **106** and the insertion operation is aborted.

If the spreadsheet user decision is to continue the insertion operation, then the current scalable template instance is no longer considered as an instance, so that the remaining command execution becomes the same as the one followed when the result of the initial test indicates that the currently selected cell does not belong to a scalable template instance.

If the currently selected cell is found outside the header part and the footer part of the current scalable template instance, but within the body part of the current scalable template instance, then the insertion operation is followed by displaying on the display device **106** the Scalable Template Insert Manager Dialog Box **1600**, as illustrated by FIG **16A**.

If the currently selected cell is found outside a scalable template instance (or if it was within the header of footer parts of the current scalable template instance that the spreadsheet user has decided to no longer consider as a scalable template instance) and if the insertion operation may lead to corrupt an existing scalable template instance, then the insertion operation is followed by displaying on the display device **106** the Scalable Template Insert Manager Dialog Box **1620**, as illustrated by FIG **16B**.

If the currently selected cell is found outside a scalable template instance (or if it was within the header of footer parts of the current scalable template instance that the spreadsheet user has decided to no longer consider as a scalable template instance) and if the insertion operation cannot corrupt any existing scalable template instance, then the conventional means interfacing the spreadsheet user for initiating an insertion operation are used.

The Scalable Template Insert Manager Dialog Box **1600** contains some pieces of information which relate to the insertion operation in the case where the currently selected cell is within an existing scalable template instance.

First the name of the scalable template abiding by the current scalable template instance is displayed in a label box **1611**.

Second the number of elements to be inserted is shown in a text box **1608**. This number takes as initial value the number of rows contained in the currently selected range of cells. If the spreadsheet user wishes to insert within the current scalable template instance another number of elements, then he/she will have to click with the pointing device **105** on the upper or lower side of the spin-button **1609** to either increase or decrease the number of elements to be inserted. This number of inserted elements will vary within a range whose boundaries are delimited by ensuring that the sum of the number of already existing elements and of the number of inserted elements remains within the minimum and maximum number of elements, as specified within the definition of the scalable template (fields "*Min Element #*" **725** and "*Max Element #*" **726** within a record **721** of the STT table **720** whose "*Name*"

field **722** matches the name displayed in the label box **1611**) and is displayed, after possible update, in the text box **1608**, whereas the currently selected range of cells is updated accordingly by containing as many rows as the number of inserted elements.

Third the mode of the insertion is specified by the presence of a black point within one of the two option buttons "*Horizontal Insert*" **1606** and "*Horizontal Insert by Range*" **1605**. If the spreadsheet user wishes to change the default mode of insertion which is "HORIZONTAL INSERT" or a previously changed mode of insertion, then he/she uses the pointing device **105** to click on one of the two option buttons "*Horizontal Insert*" **1606** and "*Horizontal Insert by Range*" **1605** which will display alone a black point specifying the new selected mode of insertion.

Fourth the check box **1610** allows the spreadsheet user to visualise and possibly to change if the current scalable template instance is considered or not as a "*Critical*" instance. If and only if the check box **1610** displays a check mark, then the current scalable template instance is a critical one. By clicking with the pointing device **105** on this check box **1610**, the spreadsheet user can swap between a "*Critical*" and not "*Critical*" instance, which is reflected by the presence or absence of a check mark within this same check box **1610**.

Fifth the push-button "*Cancel*" **1602** or the closing-window push-button **1601** allow to close the Scalable Template Insert Manager Dialog Box **1600** without further action. By clicking with the pointing device **105** on one of these two push-buttons **1601** and **1602**, the Scalable Template Insert Manager Dialog Box **1600** is closed and the scalable template insertion operation is aborted.

Sixth the push-button "*Insert*" **1603**, when first enabled and second clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of scalable template insertion. This push-button "*Insert*" **1603** is enabled (meaning that the method recognises the click event with the pointing device on this push-button "*Insert*" **1603**) when the insertion

operation is possible. The fact that this scalable template insertion operation is possible or not depends on different factors: the position of the currently selected cell within the current scalable template instance, the size of the current scalable template instance, the mode of insertion, the presence of any other existing critical scalable template instance which would be corrupted due to the insertion operation. The possibility to insert or not within the current scalable template instance a number of elements specified in the text box **1608**, at a row position corresponding to the currently selected cell, and according to the mode of insertion specified by one of the two option buttons **1605**, and **1606**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Insert Manager Dialog Box **1600**: the label box **1607** which reflects if the current scalable template instance would or not be too high after the insertion operation, and the set of 6 label boxes **1604** which are organised as a matrix of 2 rows by 3 columns and which reflect for each possible mode of insertion (one per row) if the insertion of the number of elements specified by the text box **1608** within the current scalable template instance may lead to corrupt any other existing critical scalable template instance (first column), or may lead to corrupt any other existing not critical scalable template instance or may lead to loose any existing data present in one or several spreadsheet cells. As soon as the value "YES" is taken by the label box **1607**, or by the **1304** label box located at the intersection of the leftmost column and of the row corresponding to the selected mode of insertion, then the insertion operation is considered as impossible, so that the "*Insert*" push-button **1603** get disabled. Reversely, if the value "NO" is displayed in these label boxes, then the insertion operation is possible, so that the "*Insert*" push-button **1603** get enabled. When clicked with the pointing device **105** by the spreadsheet user, the insertion operation is performed, and then the Scalable Template Insert Manager Dialog Box **1600** is closed.

The way the insertion of new elements within the current scalable template instance may corrupt another existing scalable template instance or may lead

to loose any data present in a cell is illustrated for each mode of insertion by the FIG **17A, 17B**, and **17C**.

Referring first to the FIG **17A**, one can see an illustration of the current sheet **1700** before the insertion operation is triggered. This sheet is first characterised by its number of columns *STIM_sheet_width* **1701** and by its number of rows *STIM_sheet_height* **1702**. Within this current sheet, the currently selected cell **1707** is also characterised by its row offset number *STIM_range_offset_height* **1709** and is part of the currently selected range of cells *STIM_range* **1708** which is itself characterised by a number of rows *STIM_height* **1706**. The current scalable template instance corresponds to a range of cells *STIM_instance_range* **1713** which is itself characterised by a number of columns *STIM_width* **1705**. The range of cells *STIM_instance_range* **1713** is also characterized by its row offset number *STIM_offset_height* **1704** and by its column offset number *STIM_offset_width* **1703**. Three other ranges of cells can now be identified within the current sheet **1700**:

- the range of cells *STIM_row_range* **1710** which corresponds to the row where is located the currently selected cell **1707**, but in the columns located on the right of the range of cells *STIM_instance_range* **1713**;
- the range of cells *STIM_vertical_flushed_range* **1712** which is located on the same columns than the range of cells *STIM_instance_range* **1713**, but in the *STIM_height* **1706** bottom rows; and
- the range of cells *STIM_vertical_kept_range* **1711** located between the range of cells *STIM_instance_range* **1713** and *STIM_vertical_flushed_range* **1712**.

Finally FIG **17A** also shows 4 existing scalable template instances: the ranges of cells

- *STIM_horizontal_cut_instance* **1714**,
- *STIM_vertical_lost_instance* **1717**,
- *STIM_vertical_sheared_instance* **1715**,
- *STIM_vertical_flushed_instance* **1716**.

Referring now to FIG **17B**, the "HORIZONTAL INSERT" mode is illustrated by the new inserted elements corresponding to the range of cells **1721** within the updated current sheet **1720**. With this mode, a number of rows equal to *STIM_height* **1706** is first inserted at the position occupied by the currently selected cell **1707**, then the new elements **1721** are created within the current scalable template instance. The insertion of the new rows may have some impact on existing instances.

First any instance like the *STIM_horizontal_cut_instance* **1714** (which crossed the row *STIM_row_range* **1710** of the currently selected cell **1707**) is cut into two pieces:

- the top piece **1722** which was located above the row *STIM_row_range* **1710** of the currently selected cell **1707** and
- the bottom piece **1723** which was located below the row *STIM_row_range* **1710** of the currently selected cell **1707**.

Second any instance like the *STIM_vertical_flushed_instance* **1716** (which was overlapping the last *STIM_height* **1706** rows) or *STIM_vertical_lost_instance* **1717** (which was included within the last *STIM_height* **1706** rows) is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) **1724** remains within the limits of the current sheet **1720**, or so that it is totally moved away from the current sheet **1720**, as an "out-of-sheet" range **1725**. Also any data previously located within the last *STIM_height* **1706** rows is now pushed away from the current sheet **1720**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1603** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **17C**, the "HORIZONTAL INSERT BY RANGE" mode is illustrated by the new inserted elements corresponding to the range of cells **1731** within the updated current sheet **1730**. With this mode, the range of cells which

occupies the same columns as the range of cells *STIM_instance_range* **1713**, and which occupies the rows below the currently selected cell is moved down by a number of rows equal to *STIM_height* **1706**, so that space is left available for the new inserted elements **1731**, and so that the bottom range of cells *STIM_vertical_flushed_range* **1712** is moved away from the limits of the current sheet **1730** in an area **1735**. The range move may have some impact on existing instances.

First any instance like the *STIM_vertical_sheared_instance* **1715** (which partially overlapped the range of cells which occupies the same columns as the range of cells *STIM_instance_range* **1713**, and which occupies the rows below the currently selected cell) is sheared into two pieces: the left piece **1733** and the right piece **1732**.

Second any instance like the *STIM_vertical_lost_instance* **1717** previously located within the range of cells *STIM_vertical_flushed_range* **1712** is totally moved away from the current sheet **1730** as an out-of-limit instance **1734**. Also any data previously located within the range of cells *STIM_vertical_flushed_range* **1712** is now pushed away from the current sheet **1730** in an area **1735**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1603** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

The Scalable Template Insert Manager Dialog Box **1620** comprises some pieces of information which relate to the insertion operation in the case where the currently selected cell is outside any existing scalable template instance.

First a label box **1629** filled with the reserved value "None" indicates that the currently selected cell does not belong to any existing scalable template instance.

Second the mode of the insertion is specified by the presence of a black point within one of the four option buttons "*Horizontal Insert*" **1628**, "*Horizontal Insert by Range*" **1627**, "*Vertical Insert*" **1626** and "*Vertical Insert by Range*" **1625**. If the spreadsheet user wishes to change the default mode of insertion which is "*Horizontal Insert*" or a previously changed mode of insertion, then he/she uses the pointing device **105** to click on one of the four option buttons "*Horizontal Insert*" **1628**, "*Horizontal Insert by Range*" **1627**, "*Vertical Insert*" **1626** and "*Vertical Insert by Range*" **1625** which will display alone a black point specifying the new selected mode of insertion.

Third the push-button "*Cancel*" **1622** or the closing-window push-button **1621** allow to close the Scalable Template Insert Manager Dialog Box **1620** without further action. By clicking with the pointing device **105** on one of these two push-buttons **1621** and **1622**, the Scalable Template Insert Manager Dialog Box **1620** is closed and the insertion operation is aborted.

Fourth the push-button "*Insert*" **1623**, when first enabled and second clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of insertion. This push-button "*Insert*" **1623** is enabled (meaning that the method recognises the click event with the pointing device on this push-button "*Insert*" **1623**) when the insertion operation is possible. The fact that this insertion operation is possible or not depends on different factors: the position of the currently selected cell within the current sheet of the electronic spreadsheet, the size of the currently selected range of cells, the mode of insertion, the presence of any existing critical scalable template instance which would be corrupted due to the insertion operation. The possibility to perform or not the insertion according to the mode of insertion specified by one of the four option buttons **1625**, **1626**, **1627**, and **1628**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Insert Manager Dialog Box **1620**: the set of 12 label boxes **1624** which are organised as a matrix of 4 rows by 3 columns and which reflect for each possible mode of insertion (one per row) if the insertion operation may lead to corrupt any existing critical scalable template instance

(first column), or may lead to corrupt any other existing scalable template instance or may lead to loose any existing data present in one or several spreadsheet cells. As soon as the value "YES" is taken by the **1624** label box located at the intersection of the leftmost column and of the row corresponding to the selected mode of insertion, then the insertion operation is considered as impossible, so that the "*Insert*" push-button **1623** get disabled. Reversely, if the value "NO" is displayed in this label box, then the insertion operation is possible, so that the "*Insert*" push-button **1623** get enabled. When clicked with the pointing device **105** by the spreadsheet user, the insertion operation is performed, and then the Scalable Template Insert Manager Dialog Box **1620** is closed.

The way the insertion operation may corrupt an existing scalable template instance or may lead to loose any data present in a cell is illustrated for each mode of insertion by the FIG **17D**, **17E**, **17F**, **17G** and **17H**.

Referring first to the FIG **17D**, one can see an illustration of the current sheet **1740** before the insertion operation is triggered. This sheet is first characterised by its number of columns *STIM_sheet_width* **1741** and by its number of rows *STIM_sheet_height* **1742**. Within this current sheet, the currently selected cell **1747** is also characterised by its row offset number *STIM_offset_height* **1744** and by its column offset number *STIM_offset_width* **1743**. The currently selected range of cells *STIM_range* **1748** is itself characterised by a number of rows *STIM_height* **1746** and by a number of columns *STIM_width* **1745**. Four other ranges of cells can now be identified within the current sheet **1740**: the range of cells *STIM_horizontal_flushed_range* **1750** which is located on the same rows than the range of cells *STIM_range* **1748**, but in the *STIM_width* **1745** rightmost columns; the range of cells *STIM_vertical_flushed_range* **1752** which is located on the same columns than the range of cells *STIM_range* **1748**, but in the *STIM_height* **1746** bottom rows; the range of cells *STIM_horizontal_kept_range* **1749** located between the ranges of cells *STIM_range* **1748** and *STIM_horizontal_flushed_range* **1750**; and the range

of cells *STIM_vertical_kept_range* **1751** located between the ranges of cells *STIM_range* **1748** and *STIM_vertical_flushed_range* **1752**. Finally the FIG **17D** also shows 6 existing scalable template instances: the ranges of cells *STIM_horizontal_cut_instance* **1753**, *STIM_vertical_cut_instance* **1754**, *STIM_horizontal_sheared_instance* **1755**, *STIM_vertical_sheared_instance* **1756**, *STIM_vertical_flushed_instance* **1757**, *STIM_horizontal_flushed_instance* **1758**.

Referring now to FIG **17E**, the "HORIZONTAL INSERT" mode is illustrated by the updated current sheet **1760**, resulting from the insertion of a number of rows equal to *STIM_height* **1746** at the position occupied by the currently selected cell **1747** within the currently selected range of cells which now takes the position **1761**. The insertion of the new rows may have some impact on existing instances. First any instance like the *STIM_horizontal_cut_instance* **1753** (which crossed the row of the currently selected cell **1747**) is cut into two pieces: the top piece **1762** which was located above the row of the currently selected cell **1747** and the bottom piece **1763** which was located below the row of the currently selected cell **1747**. Second any instance like the *STIM_vertical_flushed_instance* **1757** (which was overlapping the last *STIM_height* **1746** rows) is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) **1764** remains within the limits of the current sheet **1760**. Third any data previously located within the last *STIM_height* **1746** rows is now pushed away from the current sheet **1760**. As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1623** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **17F**, the "VERTICAL INSERT" mode is illustrated by the updated current sheet **1770**, resulting from the insertion of a number of columns equal to *STIM_width* **1745** at the position occupied by the currently

selected cell **1747** within the currently selected range of cells which now takes the position **1771**. The insertion of the new columns may have some impact on existing instances. First any instance like the *STIM_vertical_cut_instance* **1754** (which crossed the column of the currently selected cell **1747**) is cut into two pieces: the left piece **1772** which was located on the left of the column of the currently selected cell **1747** and the right piece **1773** which was located on the right of the column of the currently selected cell **1747**. Second any instance like the *STIM_horizontal_flushed_instance* **1758** (which was overlapping the last *STIM_width* **1745** columns) is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) **1774** remains within the limits of the current sheet **1770**. Third any data previously located within the rightmost *STIM_width* **1745** columns is now pushed away from the current sheet **1770** in an area **1776**. As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1623** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **17G**, the "HORIZONTAL INSERT BY RANGE" mode is illustrated by the updated current sheet **1780**, resulting from the insertion within range of a number of rows equal to *STIM_height* **1746** at the position occupied by the currently selected cell **1747** within the currently selected range of cells which now takes the position **1781**. With this mode, the two ranges of cells *STIM_range* **1748** and *STIM_vertical_kept_range* **1751** are moved down by a number of rows equal to *STIM_height* **1746**, so that space is left available for the new insertion **1781**, and so that the bottom range of cells *STIM_vertical_flushed_range* **1752** is moved away from the limits of the current sheet **1780**. The range move may have some impact on existing instances. First any instance like the *STIM_vertical_cut_instance* **1754** and the *STIM_vertical_sheared_instance* **1756** (which partially overlapped the two ranges of cells **1748** and **1751** moved down) are sheared into two pieces: the

left pieces **1782** and **1785** and the right pieces **1783** and **1784**. Second any instance which was overlapping the range of cells *STIM_vertical_flushed_range* **1752** is partially or totally flushed away from the current sheet, so that only a sub-set of it (possibly void) remains within the limits of the current sheet **1780**. Third any data previously located within the range of cells *STIM_vertical_flushed_range* **1752** is now pushed away from the current sheet **1780** in an area **1786**. As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1623** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **17H**, the "VERTICAL INSERT BY RANGE" mode is illustrated by the updated current sheet **1790**, resulting from the insertion within range of a number of columns equal to *STIM_width* **1745** at the position occupied by the currently selected cell **1747** within the currently selected range of cells which now takes the position **1791**. With this mode, the two ranges of cells *STIM_range* **1748** and *STIM_horizontal_kept_range* **1749** are moved right by a number of columns equal to *STIM_width* **1745**, so that space is left available for the new insertion **1791**, and so that the rightmost range of cells *STIM_horizontal_flushed_range* **1750** is moved away from the limits of the current sheet **1790** in an area **1798**. The range move may have some impact on existing instances. First any instance like the *STIM_horizontal_cut_instance* **1753**, the *STIM_vertical_cut_instance* **1754**, and the *STIM_horizontal_sheared_instance* **1755** (which partially overlapped the two ranges of cells **1748** and **1749** moved rights) are sheared into two pieces: the top pieces **1793, 1794** and **1797** and the bottom pieces **1792, 1795** and **1796**. Second any instance which was overlapping the range of cells *STIM_horizontal_flushed_range* **1750** is partially or totally flushed away from the current sheet **1790**, so that only a sub-set of it (possibly void) remains within the limits of the current sheet **1790**. Third any data previously

located within the range of cells *STIM_horizontal_flushed_range* **1750** is now pushed away from the current sheet **1790** in an area **1798**. As previously explained, if one of the corrupted existing instance is a critical instance, then the insertion operation would be considered as impossible, so that the "*Insert*" push-button **1623** remains disabled. Otherwise the insertion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

- **3. Third Operation : Removal of Elements from a Defined Scalable Template Instance**

The third operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, either:

- to remove some elements from a defined scalable template instance, or
- to clear the content of some elements within a defined scalable template instance, or
- to delete a whole defined scalable template instance, or
- even to delete some spreadsheet cells or columns or rows from the current sheet.

In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first selects a range of cells of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104.**

- **b. Scalable Template Instance Deletion Manager**

Then the spreadsheet user invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to)

- dedicated push-buttons,
- keyboard entry short cuts,
- menu or sub-menu entries,

an original specific command called "***Scalable Template Instance Deletion Manager***" which enriches the conventional means for deleting cells or rows or columns within a spreadsheet. In a preferred embodiment of the present invention, the ***"Scalable Template Instance Deletion Manager"*** command is invoked by using the same set of means as the one available in conventional electronic spreadsheets for clearing the content of a single cell or of a range of cells or for removing cells or rows or columns within a sheet, such as but not limited to

- keying the "Delete" key on the keyboard **104**, or
- clicking with the pointing device **105** on a "Delete" sub-menu entry of the "Range" menu entry, or
- keying the "Ctrl -" key on the keyboard **104**.

When the command is invoked, a test is first performed to determine if the currently selected cell belongs or not to an existing scalable template instance.

If it is the case, then a second test is performed to determine the relative position of the currently selected range of cells within this scalable template instance, which will be referred to as the current scalable template instance.

If the currently selected range of cells is overlapping, even partially, the header part or the footer part of the current scalable template instance, then the deletion operation cannot consist in removing selected elements and meta-elements as the resulting scalable template instance would be corrupted. Indeed the current scalable template instance abides by its associated scalable template which defines a structure comprising both elements and meta-elements, as the second test has shown that the current scalable template instance comprises either a footer part, or a header part, or both. Should at least a meta-element be removed from one of these parts, then the structure of the current scalable template instance would no longer abide by the structure of the associated scalable template. To globally preserve the structure of the current scalable template instance, the deletion operation must statically keep the existing meta-elements according to the structure defined by the associated scalable template. Within this structure,

the scalable template defines cells, within each element or meta-elements, that can be specified either as "IN" cells or as "OUT" cells. As the "IN" cells are those receiving spreadsheet user input, their content can be cleared without jeopardizing the global structure of the current scalable template instance. It is not the case for the "OUT" cells which should therefore be kept untouched. The determination of the "IN" cells to be cleared belongs to the spreadsheet user, under the control of the method which, in this specific case, statically manages the meta-elements. Two different sets of "IN" cells can be cleared: first the set of "IN" cells which belong to the currently selected range of cells, and second the set of "IN" cells which belong to the current scalable template instance elements and/or meta-elements sharing the same rows as the currently selected range of cells. Finally, besides this static management of meta-elements, another possible option consists in deleting the complete current scalable template instance. Thus the only available modes of deletion are:

- the mode "DELETE_IN_FIELDS_IN_SELECTED_RANGE" where are cleared the "IN" cells within the currently selected range of cells,
- the mode "DELETE_IN_FIELDS_IN_SELECTED_ROWS" where are cleared the "IN" cells found within the scalable template instance elements and/or meta-elements located on the same rows as the currently selected range of cells, and
- The mode "DELETE_SELECTED_INSTANCE" where is deleted the whole scalable template instance containing the currently selected cell, by restoring in place void cells with default display attributes.

If the currently selected range of cells is found outside the header part and the footer part of the current scalable template instance, but within the body part of the current scalable template instance, then a fourth mode of deletion becomes possible:

- the "DELETE_SELECTED_ELEMENTS" mode where are removed from the scalable template instance the elements sharing the same rows as the currently selected range of cells, by copy-pasting the underneath elements (and possible meta-elements) onto the ones contained in the currently selected range of cells.

Then the deletion operation continues by displaying on the display device **106** the Scalable Template Delete Manager Dialog Box **1900**, as illustrated by FIG **19A**.

If the currently selected cell is found outside a scalable template instance, then a conventional deletion operation may have some side effects on existing scalable template instances. It is therefore needed to dynamically determine if such a deletion operation may lead to corrupt any existing scalable template instance. Such a corruption can take different forms, but always correspond to a situation where a scalable template instance does no longer abide by its associated scalable template. A typical scalable template instance corruption case is for instance the deletion of a row comprising a meta-element belonging to an existing scalable template instance. In such a case, either the header or the footer part of this existing scalable template instance is corrupted, so that the scalable template instance, as a whole, is itself corrupted.

Once the method has dynamically determined that a meta-element, or an element, of any existing scalable template instance gets corrupted as a result of the deletion operation, then the spreadsheet user is informed about this situation, so that he/she can either cancel the deletion operation, or decide to pursue it according to the mode which minimizes the negative side effects of the deletion operation. For this purpose, this dynamic management of meta-element and/or element corruption displays on the display device **106** the Scalable Template Delete Manager Dialog Box **1920**, as illustrated by FIG **19B**, which offers five different modes of deletion:

- the mode "CONTENT_DELETE" where is cleared the content of all individual cells within the currently selected range of cells,
- the mode "HORIZONTAL_DELETE" where are removed the whole rows containing the currently selected range of cells,
- the mode "HORIZONTAL_DELETE_BY_RANGE" where the range of cells located on the right of the currently selected range of cells is shifted left to overwrite the currently selected range of cells,

- the mode "VERTICAL_DELETE" where are removed the whole columns containing the currently selected range of cells,
- the mode "VERTICAL_DELETE_BY_RANGE" where the range of cells located on the bottom of the currently selected range of cells is shifted up to overwritte the currently selected range of cells.

If the currently selected cell is found outside a scalable template instance and if the deletion operation cannot corrupt any existing scalable template instance, then the conventional means interfacing the spreadsheet user for initiating a deletion operation are used.

The Scalable Template Delete Manager Dialog Box **1900** contains some pieces of information which relate to the deletion operation in the case where the currently selected cell is within an existing scalable template instance.

First the name of the scalable template that the current scalable template instance abides by, is displayed in a label box **1911**.

Second the number of elements to be deleted is shown in a text box **1908**. This number takes as initial value the number of element rows contained in the currently selected range of cells. If the spreadsheet user wished to delete within the current scalable template instance another number of elements, then he/she will have to click with the pointing device **105** on the upper or lower side of the spin-button **1909** to either increase or decrease the number of elements to be deleted. This number of deleted elements will vary within a range whose boundaries are delimited by ensuring that the difference of the number of already existing elements with the number of deleted elements remains within the minimum and maximum number of elements, as specified within the definition of the scalable template (fields "*Min Element #*" **725** and "*Max Element #*" **726** within a record **721** of the STT table **720** whose "*Name*" field **722** matches the name displayed in the label box **1911**) and is displayed, after possible update, in the text box **1908**, whereas the currently selected range of cells is updated accordingly by containing as many element rows as the number of inserted elements.

Third the mode of the deletion is specified by the presence of a black point within one of the four option buttons:

- "*delete_IN_fields_in_selected_range*"**1905**;
- "*delete_IN_fields_in_selected_rows*" **1906;**
- "*delete_selected_elements*" **1912;** and
- "*delete_selected_instance*" **1913.**

If the spreadsheet user wishes to change the default mode of deletion which is "*delete_IN_fields_in_selected_range*" or a previously changed mode of deletion, then he/she uses the pointing device **105** to click on one of the four option buttons:

- "*delete_IN_fields_in_selected_range*"**1905,**
- "*delete_IN_fields_in_selected_rows*" **1906,**
- "*delete_selected_elements*" **1912,** and
- "*delete_selected_instance*" **1913,**

which will display alone a black point specifying the new selected mode of deletion.

Fourth the check box **1910** allows the spreadsheet user to visualise and possibly to change if the current scalable template instance is considered or not as a "*Critical*" instance. If and only if the check box **1910** displays a check mark, then the current scalable template instance is a critical one. By clicking with the pointing device **105** on this check box **1910**, the spreadsheet user can swap between a "*Critical*" and not "*Critical*" instance, which is reflected by the presence or absence of a check mark within this same check box **1910.**

Fifth the push-button "*Cancel*" **1902** or the closing-window push-button **1901** allow to close the Scalable Template Delete Manager Dialog Box **1900** without further action. By clicking with the pointing device **105** on one of these two push-buttons **1901** and **1902**, the Scalable Template Delete Manager Dialog Box **1900** is closed and the scalable template deletion operation is aborted.

Sixth the push-button "*Delete*" **1903**, when first enabled and second clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of scalable template instance deletion. This push-button "*Delete*" **1903** is enabled (meaning that the method recognises the click event with the pointing device on this push-button "*Delete*" **1903**) when the deletion operation is possible. The fact that this scalable template deletion operation is possible or not depends on different factors:

- the position of the currently selected cell within the current scalable template instance,
- the size of the current scalable template instance and of the currently selected range of cells,
- the mode of deletion.

When the deletion mode is equal to "DELETE_IN_FIELDS_IN_SELECTED_RANGE" or "DELETE_IN_FIELDS_IN_SELECTED_ROWS" or "DELETE_SELECTED_INSTANCE", then the deletion operation is always possible, so that the "*Delete*" push-button **1903** remains enabled.

When the deletion mode is equal to "DELETE_SELECTED_ELEMENTS", then the deletion operation is only possible if two conditions are met:

- first the currently selected range of cells must be entirely located within the body part of the current scalable template, as specified by the "*Selection outside body*" text box **1904** which can takes the values "YES" and "NO";
- second the number of deleted elements must result in a new number of elements remaining above the minimum number of elements in the current scalable template instance, as specified in the "*Selection too big*" text box **1907** which can takes the values "YES" and "NO".

Thus when the "DELETE_SELECTED_ELEMENTS" option button **1912** is selected, the "*Delete*" push-button **1903** is enabled if and only if the two text boxes **1904** and **1907** display the value "NO". When clicked with the pointing device **105** by the spreadsheet user, the deletion operation is performed, and then the Scalable Template Delete Manager Dialog Box **1900** is closed.

The Scalable Template Delete Manager Dialog Box **1920** contains some pieces of information which relate to the deletion operation in the case where the currently selected cell is outside any existing scalable template instance.

First a label box **1929** filled with the reserved value "None" indicates that the currently selected cell does not belong to any existing scalable template instance.

Second the mode of the deletion is specified by the presence of a black point within one of the five option buttons:

- "*Content Delete*" **1930**,
- "*Horizontal Delete*" **1928**,
- "*Horizontal Delete by Range*" **1927**,
- "*Vertical Delete*" **1926** and
- "*Vertical Delete by Range*" **1925**.

If the spreadsheet user wishes to change the default mode of deletion which is "*Content Delete*" in a preferred embodiment of the present invention, or a previously changed mode of deletion, then he/she uses the pointing device **105** to click on one of the five option buttons "*Content Delete*" **1930**, "*Horizontal Delete*" **1928**, "*Horizontal Delete by Range*" **1927**, "*Vertical Delete*" **1926** and "*Vertical Delete by Range*" **1925** which will display alone a black point specifying the new selected mode of deletion.

Third the push-button "*Cancel*" **1922** or the closing-window push-button **1921** allow to close the Scalable Template Delete Manager Dialog Box **1920** without further action. By clicking with the pointing device **105** on one of these two push-buttons **1921** and **1922**, the Scalable Template Delete Manager Dialog Box **1920** is closed and the deletion operation is aborted.

Fourth the push-button "*Delete*" **1923**, when first enabled and second clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of deletion. This push-button "*Delete*" **1923** is enabled (meaning that the method recognises the click event with the pointing device on this

push-button "*Delete*" **1923**) when the deletion operation is possible. The fact that this deletion operation is possible or not depends on different factors:

- the position of the currently selected cell within the current sheet of the electronic spreadsheet,
- the size of the currently selected range of cells,
- the mode of deletion,
- the presence of any existing critical scalable template instance which would be corrupted due to the deletion operation.

The possibility to perform or not the deletion according to the mode of deletion specified by one of the five option buttons **1925**, **1926**, **1927**, **1928** and **1930**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Delete Manager Dialog Box **1920**: the set of 15 label boxes **1924** which are organised as a matrix of 5 rows by 3 columns and which reflect for each possible mode of deletion (one per row) if the deletion operation may lead to corrupt any existing critical scalable template instance (first column), or may lead to corrupt any other existing scalable template instance or may lead to loose any existing data present in one or several spreadsheet cells.

As soon as the value "YES" is taken by the **1924** label box located at the intersection of the leftmost column and of the row corresponding to the selected mode of deletion, then the deletion operation is considered as impossible, so that the "*Delete*" push-button **1923** get disabled.

Reversely, if the value "NO" is displayed in this label box, then the deletion operation is possible, so that the "*Delete*" push-button **1923** get enabled. When clicked with the pointing device **105** by the spreadsheet user, the deletion operation is performed, and then the Scalable Template Delete Manager Dialog Box **1920** is closed.

The way the deletion operation may corrupt an existing scalable template instance or may lead to loose any data present in a cell is illustrated for each mode of deletion by the FIG **20A**, **20B**, **20C**, **20D** and **20E**.

Referring first to the FIG **20A**, one can see an illustration of the current sheet

2000 before the deletion operation is triggered. Within this current sheet, the currently selected cell **2001** is part of the currently selected range of cells *STDM_range* **2002**. Four other ranges of cells can now be identified within the current sheet **2000**:

- the range of cells *STDM_right_range* **2003** which is located on the same rows as the range of cells *STDM_range* **2002**, but in the columns on its right;
- the range of cells *STDM_bottom_range* **2004** which is located on the same columns than the range of cells *STDM_range* **2002**, but in the rows bellow it;
- the range of cells *STDM_left_range* **2005** which is located on the same rows as the range of cells *STDM_range* **2002**, but in the columns on its left; and
- the range of cells *STDM_top_range* **2006** which is located on the same columns than the range of cells *STDM_range* **2002**, but in the rows above it.

Finally the FIG **20A** also shows 3 existing scalable template instances:

- *STDM_vertical_cut_instance* **2007**,
- *STDM_vertical_sheared_instance* **2008**,
- *STDM_horizontal_sheared_instance* **2009**.

The "CONTENT DELETE" mode consists in clearing the content of every individual cell belonging to the currently selected range of cells *STDM_range* **2002**. This range of cells *STDM_range* **2002** may partially or totally overlap one or a plurality of existing scalable template instances, so that the resulting intersection is constituted by element or meta-element cells which can be either defined as "IN" cells or as "OUT" cells.

If this intersection comprises only "IN" cells, then clearing their content does not corrupt at all the scalable template instances they belong to.

Reversely if this intersection comprises "OUT" cells, the clearing their content corrupts the scalable template instances they belong to.

If one of the corrupted existing scalable template instances is a critical instance, then the deletion operation would be considered as impossible, so that the "*Delete*" push-button **1923** remains disabled.

Otherwise the deletion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **20B**, the "HORIZONTAL DELETE" mode is illustrated by the updated current sheet **2010**, resulting from the deletion of the rows occupied by the currently selected range of cells *STDM_range* **2002**, so that the *STDM_bottom_range* moves from the former position **2004** to the new position **2012**, as well as the two other ranges of cells **2011** and **2013** occupying the same rows, and so that a new range of void cells **2015** is appended at the bottom of the current sheet **2010**. The deletion of the rows may have some impact on existing instances.

First any instance like the *STDM_horizontal_sheared_instance* **2009** (which overlapped partially or totally the rows occupied by the currently selected range of cells **2002**) is reduced to a remaining piece (potentially void): the piece **2014** which was located below the deleted rows.

Second any data previously located within the ranges of cells *STDM_range* **2002**, *STDM_left_range* **2005** and *STDM_right_range* **2003** is now pushed away from the current sheet **2010**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the deletion operation would be considered as impossible, so that the "*Delete*" push-button **1923** remains disabled.

Otherwise the deletion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **20C**, the "VERTICAL DELETE" mode is illustrated by the updated current sheet **2020**, resulting from the deletion of the columns occupied by the currently selected range of cells *STDM_range* **2002**, so that the *STDM_right_range* moves from the former position **2003** to the new

position **2022**, as well as the two other ranges of cells **2021** and **2023** occupying the same columns, and so that a new range of void cells **2026** is appended at the right of the current sheet **2020**. The deletion of the columns may have some impact on existing instances.

First any instance like the *STDM_vertical_cut_instance* **2007** or the *STDM_vertical_sheared_instance* **2008** (which overlapped partially or totally the columns occupied by the currently selected range of cells **2002**) is reduced to a remaining piece (potentially void): the left piece **2024** which was located on the left of the deleted columns and the right piece **2025** which was located on the right of the deleted columns.

Second any data previously located within the ranges of cells *STDM_range* **2002**, *STDM_bottom_range* **2004** and *STDM_top_range* **2006** is now pushed away from the current sheet **2020**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the deletion operation would be considered as impossible, so that the "*Delete*" push-button **1923** remains disabled.

Otherwise the deletion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **20D**, the "HORIZONTAL DELETE BY RANGE" mode is illustrated by the updated current sheet **2030**, resulting from the row deletion within range of the previously selected range of cells *STDM_range* **2002**, so that the range of cells *STDM_bottom_range* moves from the former position **2004** to the new position **2031**, and so that a new range of void cells **2032** is introduced below the new position of the range of cells *STDM_bottom_range* **2031**. The range move may have some impact on existing instances.

First any instance like the *STDM_vertical_sheared_instance* **2008** (which partially or totally overlapped the range of cells made by the concatenation of the ranges of cells *STDM_range* **2002** and *STDM_bottom_range* **2004**) are sheared into two pieces (possibly void): the left piece **2033** and the right piece **2034**.

Second any data previously located within the range of cells *STDM_range* **2002** is now pushed away from the current sheet **2030**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the deletion operation would be considered as impossible, so that the "*Delete*" push-button **1923** remains disabled.

Otherwise the deletion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

Referring now to FIG **20E**, the "VERTICAL DELETE BY RANGE" mode is illustrated by the updated current sheet **2040**, resulting from the column deletion within range of the previously selected range of cells *STDM_range* **2002**, so that the range of cells *STDM_right_range* moves from the former position **2003** to the new position **2041**, and so that a new range of void cells **2042** is introduced on the right of the new position of the range of cells *STDM_right_range* **2041**.

The range move may have some impact on existing instances.

First any instance like the *STDM_horizontal_sheared_instance* **2009** (which partially or totally overlapped the range of cells made by the concatenation of the two ranges of cells *STDM_range* **2002** and *STDM_right_range* **2041**) are sheared into two pieces (possibly void): the top piece **2044** and the bottom piece **2043**.

Second any data previously located within the range of cells *STDM_range* **2002** is now pushed away from the current sheet **2040**.

As previously explained, if one of the corrupted existing instance is a critical instance, then the deletion operation would be considered as impossible, so that the "*Delete*" push-button **1923** remains disabled.

Otherwise the deletion operation is performed, and any existing impacted scalable template instance will no longer be considered as a scalable template instance.

- **4. Fourth Operation : Definition Updates of Element Formats or Profiles**

The fourth operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to update the definition of

- existing element formats, or
- meta-element formats, or
- element profiles, or
- meta-element profiles,

so that the new definition gets automatically reflected in every scalable template instance abiding by an updated scalable template. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to)
  - dedicated push-buttons,
  - keyboard entry short cuts,
  - menu or sub-menu entries,

  the original command called ***"Scalable Template Manager"***, followed by one of the original commands called ***"Element Format Editor"***, or ***"Element Profile Editor"*** in order to start updating either an existing element format, or an existing meta-element format, or an existing element profile, or an existing meta-element profile. This initial step corresponds to the first step of the first operation of this scenario, followed by the second, or third step of the first operation of this scenario.

- **b. Scalable Template Refresh Manager**

  Then the spreadsheet user invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to)
  - dedicated push-buttons,
  - keyboard entry short cuts,
  - menu or sub-menu entries,

  an original specific command called ***"Scalable Template Refresh Manager"*** which identifies if at least one existing scalable template instance abides by the object updated during the previous step, and then retrofits the update onto the scalable template instances.

If the updated object (either an element format, or a meta-element format, or an element profile or a meta-element profile) is not referenced in at least a scalable template that at least one existing scalable template instance abides by, then a warning message is displayed on the display device **106**, as illustrated with the dialog box **2200** described within the FIG **22A**. This dialog box **2200** contains a text window **2203** specifying the warning message. The spreadsheet user can close this dialog box **2200** by clicking with the pointing device **105** on the "*OK*" push button **2202** or on the closing-window push button **2201**.

If the updated object is referenced in at least one scalable template that at least one existing scalable template instance abides by, then the Refresh operation does effectively take place. This operation consists:

- first in identifying each existing scalable template instance which abides by a scalable template which references the updated object,
- then in identifying within each found scalable template instance all elements or meta-elements which depend on the updated object, and
- finally in refreshing each identified element or meta-element according to the change of the updated object. This element or meta-element Refresh operation depends on the nature of the updated object.

If the updated object is an element format or a meta-element format, then the Refresh operation of a given element or meta-element consists in performing a conventional copy-paste operation by attribute (the content and the destination ("IN" cell vs "OUT" cell) being kept untouched) from the new object illustrative range of cells **634** onto the given element or meta-element.

If the updated object is an element profile or a meta-element profile, then the Refresh operation of a given element or meta-element consists in performing a conventional copy-paste operation by content and by destination ("IN" cell vs "OUT" cell), the attributes being kept untouched, from each cell of the new object illustrative range of cells **654** onto each corresponding cell of the given element or meta-element. This copy-paste operation by content and

destination is performed cell after cell, starting with the leftmost cell, and up to the rightmost one. For a given relative cell position within the corresponding ranges of cells (element or meta-element and illustrative rang of cells **654**), the copy-paste operation by content is performed unless the two following conditions are fulfilled:

- both in its previous and updated profile definition, the current cell is considered as an "IN" cell, and
- the content of the cell in the element or meta-element is different from the content of the cell in the previous profile definition.

These two tests are necessary to avoid the overwritting of an "IN" cell which content was already filled by the spreadsheet user. Indeed in such a case, the default cell content, as specified in the previous profile definition, has been replaced by a user-specifed content which must not be lost. As a result, the updated profile definition is reflected in cells of elements or meta-elements in the following situations:

- the cell is defined in the updated destination as an "OUT" cell, or
- the destination of the cell is updated and the cell becomes an "IN" cell while the cell was defined in the previous destination as an "OUT" cell, or
- the destination is unchanged and the cell remains an "IN" cell while the cell content matches the content defined in the previous profile definition.

When every cell of every refreshed element or meta-element of every refreshed instance has been refreshed, the refresh operation is completed, and an information message is displayed on the display device **106**, as illustrated with the dialog box **2210** described within the FIG **22B**. This dialog box **2210** contains a text window **2213** specifying the information message. The spreadsheet user can close this dialog box **2210** by clicking with the pointing device **105** on the "*OK*" push button **2212** or on the closing-window push button **2211**.

- **5. Fifth Operation : Copy/Cut and Paste a Scalable Template Instance**

The fifth operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to perform a copy-and-paste or a cut-and-paste operation with a given scalable template instance. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first selects a range of cells of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104**.

- **b. Scalable Template Instance Copy**

  Then the spreadsheet user invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to)
  - dedicated push-buttons,
  - keyboard entry short cuts,
  - menu or sub-menu entries,

  one of the two original commands called "***Scalable Template Instance Copy***", or "***Scalable Template Instance Cut***" in order to copy or cut onto the clipboard available as part of the memory storage **102** the selected range of cells, or any elements or meta-elements contained in the selected range of cells or even the whole scalable template instance containing the currently selected cell.

  When the ***Scalable Template Instance Copy*** command is invoked, a test is first performed to determine whether the currently selected cell belongs or not to an existing scalable template instance.

  If it is not the case, then a conventional Copy operation is performed from the currently selected range of cells onto the clipboard.

  If it is the case, then three different modes of copy become possible.

  The first copy mode is the "RANGE" mode which corresponds to the conventional copy operation where the currently selected range of cells is copied onto the clipboard.

The second copy mode is the "ELEMENT" mode where the range of cells to be copied onto the clipboard corresponds to the elements and meta-elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells.

The third copy mode is the "INSTANCE" mode where the range of cells to be copied onto the clipboard corresponds to the whole scalable template instance to which the currently selected cell belongs.

To determine which copy mode to use, the Scalable Template Instance Copy Manager Dialog Box **2300** is displayed on the display device **106**, as illustrated by FIG **23A**. This Scalable Template Instance Copy Manager Dialog Box **2300** contains some pieces of information which relate to the copy operation.

First the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by, is displayed in the label box **2311**.

Second the copy mode is specified by the presence of a black point within one of the three option buttons

- "*Copy as a range of cells*" **2310**,
- "*Copy as elements*" **2309**, and
- "*Copy as an Instance*" **2308**,

respectively corresponding to the copy modes "RANGE", "ELEMENT" and "INSTANCE". If the spreadsheet user wishes to change the default copy mode which is "RANGE" in a preferred embodiment of the present invention, or a previously changed copy mode, then he/she uses the pointing device **105** to click on one of the three option buttons "*Copy as a range of cells*" **2310**, "*Copy as elements*" **2309**, and "*Copy as an Instance*" **2308** which will display alone a black point specifying the new selected copy mode.

Third the push-button "*Cancel*" **2302** or the closing-window push-button **2301** allow to close the Scalable Template Instance Copy Manager Dialog Box

2300 without further action. By clicking with the pointing device **105** on one of these two push-buttons **2301** and **2302**, the Scalable Template Instance Copy Manager Dialog Box **2300** is closed and the copy operation is aborted.

Fourth the push-button "*Copy*" **2303**, when clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of copy. This push-button "*Copy*" **2303** is always enabled (meaning that the method recognises the click event with the pointing device **105** on this push-button "*Copy*" **2303**) as the copy operation is always possible. This is reflected by the three label boxes **2305**, **2306** and **2307** in the "*Possible*" columns **2304**, which always display the value "YES" to reflect that the three different copy modes are always available. When the push-button "*Copy*" **2303** is clicked with the pointing device **105** by the spreadsheet user, the selected copy mode is used to determine how to reshape the currently selected range of cells.

If the selected copy mode is the "RANGE" mode (option button **2310** displaying a black point), then the currently selected range of cells is kept as is.

If the selected copy mode is the "ELEMENT" mode (option button **2309** displaying a black point), then the currently selected range of cells is reshaped to correspond to the elements and meta-elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells.

If the selected copy mode is the "INSTANCE" mode (option button **2308** displaying a black point), then the currently selected range of cells is reshaped to correspond to the whole scalable template instance to which the currently selected cell belongs.

Once the reshape is done, a conventional copy operation is performed from the reshaped range of cells onto the memory clipboard. Then the Scalable Template Instance Copy Manager Dialog Box **2300** is closed to complete the processing of the ***Scalable Template Instance Copy*** command.

- **c. Scalable Template Instance Cut**

When the ***Scalable Template Instance Cut*** command is invoked, a test is first performed to determine if the currently selected range of cells overlaps or not (totally or partially) one or several existing scalable template instances.

If it is not the case, then a conventional Cut operation is performed from the currently selected range of cells onto the clipboard.

If it is the case, then a second test is performed to determine if the currently selected cell belongs or not to an existing scalable template instance.

If it is not the case, then a conventional cut operation will be possible, at the cost of corrupting the existing scalable template instances which overlap with the currently selected range of cells.

If it is the case, then three different modes of cut become possible.

The first cut mode is the "RANGE" mode which corresponds to the conventional cut operation where the currently selected range of cells is cut onto the clipboard. With this first mode, any existing scalable template instance overlapping with the cut range of cells will be corrupted.

The second cut mode is the "ELEMENT" mode where the range of cells to be cut onto the clipboard corresponds to the elements and meta-elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells. With this second mode, the aforementioned elements and meta-elements are in fact copied onto the clipboard, and then only their cells specified as "IN" cells are changed with empty content.

The third cut mode is the "INSTANCE" mode where the range of cells to be cut onto the clipboard corresponds to the whole scalable template instance to which the currently selected cell belongs. With this third mode, the scalable template instance to which the currently selected cell belongs is in fact moved to the clipboard, and is thus no longer considered as an existing scalable template instance.

To determine which cut mode to use, the Scalable Template Instance Cut Manager Dialog Box **2320** is displayed on the display device **106**, as illustrated by FIG **23B**. This Scalable Template Instance Cut Manager Dialog Box **2320** contains some pieces of information which relate to the cut operation.

First the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by, is displayed in the label box **2331** (if such a scalable template instance does not exist, then the label box **2331** displays the reserved name "NONE").

Second the cut mode is specified by the presence of a black point within one of the three option buttons

- "*Cut as a range of cells*" **2330**,
- "*Cut as elements*" **2329**, and
- "*Cut as an Instance*" **2328**,

respectively corresponding to the cut modes "RANGE", "ELEMENT" and "INSTANCE". If the spreadsheet user wishes to change the default cut mode which is "RANGE" in a preferred embodiment of the present invention, or a previously changed cut mode, then he/she uses the pointing device **105** to click on one of the three option buttons "*Cut as a range of cells*" **2330**, "*Cut as elements*" **2329**, and "*Cut as an Instance*" **2328** which will display alone a black point specifying the new selected cut mode.

Third the push-button "*Cancel*" **2322** or the closing-window push-button **2321** allow to close the Scalable Template Instance Cut Manager Dialog Box **2320** without further action. By clicking with the pointing device **105** on one of these two push-buttons **2321** and **2322**, the Scalable Template Instance Cut Manager Dialog Box **2320** is closed and the cut operation is aborted.

Fourth the push-button "*Cut*" **2323**, when clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of cut. This push-button "*Cut*" **2323** is enabled (meaning that the method recognises the click event with the pointing device **105** on this push-button "*Cut*" **2323**) when the cut operation is possible. The fact that this cut operation is possible or not depends on different factors:

- the position of the currently selected cell within an existing scalable template instance,

- the overlap of the currently selected range of cells with existing scalable template instance(s),
- the mode of cut, and
- the presence of any existing critical scalable template instance which would be corrupted due to the cut operation.

The possibility to perform or not the cut operation according to the cut mode specified by one of the three option buttons **2330**, **2329**, and **2328**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Instance Cut Manager Dialog Box **2320**.

The two label boxes **2332** and **2333** reflect for the cut mode "RANGE" if the cut operation may lead to corrupt any existing critical scalable template instance (label box **2332**), or may lead to corrupt any other existing scalable template instance (label box **2333**). As soon as the value "YES" is taken by the **2332** label box, the label box **2325** located in the "*Possible*" column **2324** takes the value "NO" reflecting that the cut mode "RANGE" is not possible.

The label box **2326** takes the value "YES" as soon as the currently selected cell is located within an existing scalable template instance, so that the "ELEMENT" cut mode is possible.

The label box **2327** takes the value "YES" as soon as the currently selected cell is located within an existing scalable template instance, so that the "INSTANCE" cut mode is possible. As soon as the value "NO" is taken by the **2325** label box when the option button **2330** displays a black point, or by the **2326** label box when the option button **2329** displays a black point, or by the **2327** label box when the option button **2328** displays a black point, then the cut operation is considered as impossible, so that the "*Cut*" push-button **2323** gets disabled.

Reversely, if the value "YES" is displayed instead of the value "NO", then the cut operation is possible, so that the "*Cut*" push-button **2323** get enabled. When the "*Cut*" push-button **2323** is clicked with the pointing device **105** by the spreadsheet user, the selected cut mode is used to determine how to reshape the currently selected range of cells.

If the selected cut mode is the "RANGE" mode (option button **2330** displaying a black point), then the currently selected range of cells is kept as is.

If the selected cut mode is the "ELEMENT" mode (option button **2329** displaying a black point), then the currently selected range of cells is reshaped to correspond to the elements and meta-elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells.

If the selected cut mode is the "INSTANCE" mode (option button **2328** displaying a black point), then the currently selected range of cells is reshaped to correspond to the whole scalable template instance to which the currently selected cell belongs.

Once the reshape is done, a conventional cut operation is performed from the reshaped range of cells onto the memory clipboard, when the cut mode is either "RANGE" or "INSTANCE". In the case the cut mode is equal to "ELEMENT", a conventional copy operation is first performed from the reshaped range of cells onto the memory clipboard, and then all the "IN" cells within this reshaped range of cells are updated with a void content. Then the Scalable Template Instance Cut Manager Dialog Box **2320** is closed to complete the processing of the ***Scalable Template Instance Cut*** command.

- **d.** The spreadsheet user then selects another range of cells of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104**.

- **e. Scalable Template Instance Paste**

Then the spreadsheet user invokes thanks to conventional means available in spreadsheet environment, such as (but not limited to)

- dedicated push-buttons,
- keyboard entry short cuts,
- menu or sub-menu entries,

an original specific command called "***Scalable Template Instance Paste***" which pastes the content of the clipboard onto the currently selected cell.

When the ***Scalable Template Instance Paste*** command is invoked, the first

step consists in determining according to conventional means the range of cells which will receive the information previously copied or cut onto the clipboard. This range of cells will be referred to as the *dest_range*.

- If the previously copied or cut range of cells is made of a single column and of multiple rows, then *dest_range* corresponds to a range of cells occupying the same columns as the currently selected range of cells, and occupying as many rows as the range of cells previously copied or cut.
- If the previously copied or cut range of cells is made of a single row and of multiple columns, then *dest_range* corresponds to a range of cells occupying the same rows as the currently selected range of cells, and occupying as many columns as the range of cells previously copied or cut.
- If the previously copied or cut range of cells is made of a single cell, then *dest_range* corresponds to the currently selected range of cells.
- In all the other cases, *dest_range* occupies as many rows and columns as the previously copied or cut range of cells, with the top left cell located on the position of the currently selected cell.

Then an initial test is performed to determine if the range of cells *dest_range* overlaps or not (totally or partially) one or several existing scalable template instances.

- If it is not the case, then a conventional Paste operation is performed from the clipboard onto the range of cells *dest_range*. This conventional paste mode of operation is referred to as the "RANGE" paste mode. Then a second test is performed to determine if the previous copy or cut operation was done with the mode "INSTANCE".
  - If it is the case, then it means that a whole instance was present in the clipboard, so that the conventional Paste operation has created a new instance, and so that this new instance must be recorded within the spreadsheet environment.
  - If it is not the case, then the conventional Paste operation completes without further action.

- If the range of cells *dest_range* does overlap one or several existing scalable template instances, then several different situations are considered.

First

- if the previous copy or cut operation was done with the mode "RANGE" and
- if the range of cells *dest_range* only overlaps "IN" cells in the scalable template instances,

then a conventional paste operation is performed from the clipboard onto the range of cells *dest_range*.

Second

- if the previous copy or cut operation was done with the mode "RANGE" and
- if the range of cells *dest_range* overlaps at least one "OUT" cell in the scalable template instances,

then the overlapped scalable templates instances will be corrupted by the paste operation. The spreadsheet user must thus be prompted to either continue or cancel the paste operation.

Third

- if the previous copy or cut operation was not done with the mode "RANGE" and
- if the currently selected cell does not belong to a scalable template instance and
- if the range of cells *dest_range* only overlaps "IN" cells in the scalable template instances,

then a conventional paste operation is performed from the clipboard onto the range of cells *dest_range*.

Fourth

- if the previous copy or cut operation was not done with the mode "RANGE" and

- if the currently selected cell does not belong to a scalable template instance and
- if the range of cells *dest_range* overlaps at least one "OUT" cell in the scalable template instances,

then the overlapped scalable templates instances will be corrupted by the paste operation. The spreadsheet user must thus be prompted to either continue or cancel the paste operation.

Fifth

- if the previous copy or cut operation was done with the mode "ELEMENT" and
- if the currently selected cell belongs to a scalable template instance and
- if the structure of the elements or meta-elements copied or cut onto the clipboard is the same as the structure of the elements or meta-elements of the scalable template instance to which the currently selected cell belongs, and which are located on the same rows as the range of cells *dest_range*,

then it is possible to safely paste (meta-)element by (meta-)element the clipboard onto the elements or meta-elements of the scalable template instance to which the currently selected cell belongs, and which are located on the same rows as the range of cells *dest_range*. This paste mode is referred to as the "ELEMENT" mode and the spreadsheet user must be prompted to select :

- this "ELEMENT" mode, or
- the "RANGE" mode, or
- simply to cancel the paste operation.

Sixth

- if the previous copy or cut operation was done with the mode "ELEMENT" and
- if the currently selected cell belongs to a scalable template instance and
- if the structure of the elements or meta-elements copied or cut onto the clipboard is not the same as the structure of the elements or

meta-elements of the scalable template instance to which the currently selected cell belongs, and which are located on the same rows as the range of cells *dest_range*,

then it is not possible to safely paste (meta-)element by (meta-)element the clipboard onto the elements or meta-elements of the scalable template instance to which the currently selected cell belongs, and which are located on the same rows as the range of cells *dest_range*. Therefore only the "RANGE" paste mode is possible, at the cost of corrupting the overlapped scalable template instances. The spreadsheet user must thus be prompted to either continue or cancel the paste operation.

Seventh

- if the previous copy or cut operation was done with the mode "INSTANCE" and
- if the currently selected cell belongs to a scalable template instance and
- if the size of the scalable template instance copied or cut onto the clipboard is the same as the size of the scalable template instance to which the currently selected cell belongs,

then it is possible to safely paste the whole scalable template instance from the clipboard onto the one to which the currently selected cell belongs. This paste mode is referred to as the "INSTANCE" mode and the spreadsheet user must be prompted to select

- this "INSTANCE" mode, or
- the "RANGE" mode, or
- simply to cancel the paste operation.

Eighth

- if the previous copy or cut operation was done with the mode "INSTANCE" and
- if the currently selected cell belongs to a scalable template instance and

- if the size of the scalable template instance copied or cut onto the clipboard is not the same as the size of the scalable template instance to which the currently selected cell belongs,

then it is not possible to safely paste the whole scalable template instance from the clipboard onto the one to which the currently selected cell belongs. Therefore only the "RANGE" paste mode is possible, at the cost of corrupting the overlapped scalable template instances. The spreadsheet user must thus be prompted to either continue or cancel the paste operation.

To determine if the paste operation must be performed and which paste mode to use, the Scalable Template Instance Paste Manager Dialog Box **2340** is displayed on the display device **106**, as illustrated by FIG **23C**. This Scalable Template Instance Paste Manager Dialog Box **2340** contains some pieces of information which relate to the paste operation.

First the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by, is displayed in the label box **2351** (if such a scalable template instance does not exist, then the label box **2351** displays the reserved name "NONE").

Second the name of the scalable template that the scalable template instance which has been previously copied or cut onto the clipboard, abides by, is displayed in the label box **2354** (if such a scalable template instance was not previously copied or cut onto the clipboard, then the label box **2354** displays the reserved name "NONE").

Third the paste mode is specified by the presence of a black point within one of the three option buttons "*Paste as a range of cells*" **2350**, "*Paste as elements*" **2349**, and "*Paste as an Instance*" **2348**, respectively corresponding to the paste modes "RANGE", "ELEMENT" and "INSTANCE". If the spreadsheet user wishes to change the default paste mode which is "RANGE" in a preferred embodiment of the present invention, or a previously changed paste mode, then he/she uses the pointing device **105** to click on one of the three option

buttons "*Paste as a range of cells*" **2350**, "*Paste as elements*" **2349**, and "*Paste as an Instance*" **2348** which will display alone a black point specifying the new selected paste mode.

Fourth the push-button "*Cancel*" **2342** or the closing-window push-button **2341** allow to close the Scalable Template Instance Paste Manager Dialog Box **2340** without further action. By clicking with the pointing device **105** on one of these two push-buttons **2341** and **2342**, the Scalable Template Instance Paste Manager Dialog Box **2340** is closed and the paste operation is aborted.

Fifth the push-button "*Paste*" **2343**, when clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the operation of paste. This push-button "*Paste*" **2343** is enabled (meaning that the method recognises the click event with the pointing device **105** on this push-button "*Paste*" **2343**) when the paste operation is possible. The fact that this paste operation is possible or not depends on different factors:

- the position of the currently selected cell within an existing scalable template instance,
- the overlap of the range of cells *dest_range* with existing scalable template instance(s), the mode of paste,
- the last mode of copy or cut, and
- the presence of any existing critical scalable template instance which would be corrupted due to the paste operation.

The possibility to perform or not the paste operation according to the paste mode specified by one of the three option buttons **2350**, **2349**, and **2348**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Instance Paste Manager Dialog Box **2340**.

The two label boxes **2352** and **2353** reflect for the paste mode "RANGE" if the paste operation may lead to corrupt any existing critical scalable template instance (label box **2352**), or may lead to corrupt any other existing scalable template instance (label box **2353**).

As soon as the value "YES" is taken by the **2352** label box, the label box **2345** located in the "*Possible*" column **2344** takes the value "NO" reflecting that the cut mode "RANGE" is not possible.

The label box **2346** takes the value "YES" as soon as the "ELEMENT" paste mode is possible (fifth case in the aforementioned situations).

The label box **2347** takes the value "YES" as soon as the "INSTANCE" paste mode is possible (seventh case in the aforementioned situations). As soon as the value "NO" is taken

- by the **2345** label box when the option button **2350** displays a black point, or
- by the **2346** label box when the option button **2349** displays a black point, or
- by the **2347** label box when the option button **2348** displays a black point,

then the paste operation is considered as impossible, so that the "*Paste*" push-button **2343** get disabled.

Reversely, if the value "YES" is displayed instead of the value "NO", then the paste operation is possible, so that the "*Paste*" push-button **2343** get enabled.

When the "*Paste*" push-button **2343** is clicked with the pointing device **105** by the spreadsheet user, the selected paste mode is used to determine how to reshape the range of cells *dest_range*.

- If the selected paste mode is the "RANGE" mode (option button **2350** displaying a black point), then the range of cells *dest_range* is kept as is.
- If the selected paste mode is the "ELEMENT" mode (option button **2349** displaying a black point), then the range of cells *dest_range* is reshaped to correspond to the elements and meta-elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the current position of the range of cells *dest_range*.
- If the selected paste mode is the "INSTANCE" mode (option button **2348** displaying a black point), then the range of cells *dest_range* is reshaped to correspond to the whole scalable template instance to which the currently selected cell belongs. Once the reshape is done, a conventional paste operation is performed from the memory clipboard onto the reshaped range

of cells. When the paste mode is equal to "INSTANCE", the newly created range of cells is recorded as a valid scalable template instance in the spreadsheet environment and replaces the scalable template instance which the currently selected cells was belonging to.

Finally the Scalable Template Instance Paste Manager Dialog Box **2340** is closed to complete the processing of the ***Scalable Template Instance Paste*** command.

- **6. Sixth Operation : Import / Export of Element Format, Element Profile, Scalable Template**

The sixth operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to share, through an import / export mechanism, a set of one or several

- element formats, and/or
- meta-element formats, and/or
- element profiles, and/or
- meta-element profiles, and/or
- scalable templates,

between a source spreadsheet file and a destination spreadsheet file. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user invokes first an original specific command called "***Scalable Template Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to visualise any existing :
  - element format, or
  - meta-element format, or
  - element profile, or
  - meta-element profile, or
  - scalable template.

This initial step corresponds to the first step of the first operation of this scenario, where the spreadsheet user can select one or multiple element

formats, or meta-element formats, or element profiles, or meta-element profiles, or scalable templates.

- **b. Scalable Template Export Manager**

Then the spreadsheet user invokes an original specific command called "***Scalable Template Export Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to store in an Export/Import file the set of selected element formats or meta-element formats or element profiles or meta-element profiles or scalable templates.

This can be illustrated with the user interface described with the FIG **26A**, showing the Scalable Template Export Dialog Box **2600**, as displayed on the display device **106**. When first displayed, the Scalable Template Export Dialog Box **2600** contains three push-buttons, leaving to the spreadsheet user the choice

- to either cancel the Export operation (by clicking with the pointing device **105** on the "*Cancel*" push-button **2602**), or
- to start an Export operation in a new export-import file to be created (by clicking with the pointing device **105** on the "*Export in a NEW file*" push-button **2612**), or
- to start an Export operation in an already existing export-import file to be selected (by clicking with the pointing device **105** on the "*Export in an EXISTING file*" push-button **2613**).

If the "*Cancel*" push-button **2602** is clicked, then the Scalable Template Export Dialog Box **2600** is closed and the Export operation completes without any further action.

If the "*Export in a NEW file*" push-button **2612** is clicked, then a conventional file creation dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, name and create a new file within a selected file directory. Any similar conventional means could also be used instead of the file creation dialog box without departing from the spirit of the present invention.

If the "*Export in an EXISTING file*" push-button **2613** is clicked, then a conventional file selection dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, and then select an existing file within a file directory. Any similar conventional means could also be used instead of the file selection dialog box without departing from the spirit of the present invention.

Once the existing file has been specified by the spreadsheet user, a test is performed to check if this file is a valid export-import file, and follows as such a pre-defined logical file structure.

If it is not the case, then the spreadsheet user is warned about this situation. To this effect a warning message is issued on the display device **106** through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this file case, and the spreadsheet user is then invited through conventional prompting means such as an "*OK*" push-button, to acknowledge the warning. The warning message is then closed, so that the spreadsheet user can click again with the pointing device **105** on one of the three push-buttons **2602**, **2612** and **2613** available within the Scalable Template Export Manager Dialog Box **2600**.

If the user-specifed existing file is a correct export-import file, or if the user choice was to create a new export-import file, then the Scalable Template Export Manager Dialog Box **2600** is completed with the text box **2603** displaying the name of the export-import file.

Then the Export operation is launched by moving (from the spreadsheet file towards the export-import file) one by one every member of the set of selected element formats or meta-element formats or element profiles or meta-element profiles or scalable templates. The progress of the Export operation is reflected by the progress bar **2604** which graphically translates the portion of processing already completed of the whole Export operation.

During this Export operation, in the case where the export-import file was an already existing one, a potential conflict may be identified between a version of an object (either an element format or a meta-element format or an

element profile or a meta-element profile or a scalable template) previously exported within this export-import file and a new version of the same object candidate to be exported. If this situation arises, then the Scalable Template Export Manager Dialog Box **2600** is completed with a set of information, all contained within the frame **2611**.

- First the name of the conflicting object is displayed in the text box **2605**.
- Second the date associated to the object version found in the specified export-import file is displayed in the text box **2606**.
- Third the date associated to the object candidate for export is displayed in the text box **2607**.

By receiving all this information, the spreadsheet user can decide how to handle this conflict.

The first choice is to click with the pointing device **105** on the "*No*" push-button **2608** to prevent the Export operation for this specific object, so that the former version recorded within the specified export-import file is kept unchanged.

The second choice is to click with the pointing device **105** on the "*Yes*" push-button **2610** to proceed with the Export operation for this specific object, that is to replace the current object version definition recorded in the export-import file by the one defined as part of the current spreadsheet file.

The third choice is to click with the pointing device **105** on the "*Yes to All*" push-button **2609** to proceed with the Export operation for this specific object, but also for any other object which would also fall in the same type of conflict case.

Once the spreadsheet user has clicked with the pointing device **105** on one of the three push-buttons **2608**, **2609**, or **2610**, the frame **2611** disappears from the Scalable Template Export Manager Dialog Box **2600** with all the graphical objects it contains (labels, text boxes and push-buttons). When all the objects part of the set of selected objects (element formats or meta-element formats or element profiles or meta-element profiles or scalable templates) have been processed by the Export operation, the Scalable Template Export Manager Dialog Box **2600** is closed on the display device **106**, and the export-import file (either new or updated) is ready to be imported to another spreadsheet

file.

- **c. Scalable Template Import Manager**

Then the spreadsheet user moves to another electronic spreadsheet file and then invokes an original specific command called "***Scalable Template Import Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to retrieve from an export-import file a set of one or several

- element formats and/or
- meta-element formats and/or
- element profiles and/or
- meta-element profiles and/or
- scalable templates.

This can be illustrated with the user interface described with the FIG **26B**, showing the Scalable Template Import Dialog Box **2620**, as displayed on the display device **106**. When first displayed, the Scalable Template Import Dialog Box **2620** contains two push-buttons, leaving to the spreadsheet user the choice

- to either cancel the Import operation (by clicking with the pointing device **105** on the "*Cancel*" push-button **2622**), or
- to start an Import operation from an already existing export-import file to be selected (by clicking with the pointing device **105** on the "*Select an Import File*" push-button **2632**).

If the "*Cancel*" push-button **2622** is clicked, then the Scalable Template Import Dialog Box **2620** is closed and the Import operation completes without any further action.

If the "*Select an Import File*" push-button **2632** is clicked, then a conventional file selection dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, and then select an existing file within a file directory. Any similar conventional means

could also be used instead of the file selection dialog box without departing from the spirit of the present invention.

Once the existing file has been specified by the spreadsheet user, a test is performed to check if this file is a valid export-import file, and follows as such a pre-defined logical file structure.

If it is not the case, then the spreadsheet user is warned about this situation. To this effect a warning message is issued on the display device **106** through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this file case, and the spreadsheet user is then invited through conventional prompting means such as an "*OK*" push-button, to acknowledge the warning. The warning message is then closed, so that the spreadsheet user can click again with the pointing device **105** on one of the two push-buttons **2622**, and **2632** available within the Scalable Template Import Manager Dialog Box **2620**.

If the user-specifed file is a correct export-import file, then the Scalable Template Import Manager Dialog Box **2620** is completed with the text box **2623** displaying the name of the export-import file. Then the Import operation is launched by moving (from the export-import file towards the spreadsheet file) one by one every element format or meta-element format or element profile or meta-element profile or scalable template recorded in the export-import file. The progress of the Import operation is reflected by the progress bar **2624** which graphically translates the portion of processing already completed of the whole Import operation.

During this Import operation, a potential conflict may be identified between a version of an object (either an element format or a meta-element format or an element profile or a meta-element profile or a scalable template) already defined within the spreadsheet file and a version recorded within this export-import file. If this situation arises, then the Scalable Template Import Manager Dialog Box **2620** is completed with a set of information, all contained within the frame **2631**.

- First the name of the conflicting object is displayed in the text box **2625**.

- Second the date associated to the object version found in the spreadsheet file is displayed in the text box **2626**.
- Third the date associated to the object version recorded in the export-import file is displayed in the text box **2627**.

By receiving all this information, the spreadsheet user can decide how to handle this conflict.

The first choice is to click with the pointing device **105** on the "*No*" push-button **2628** to prevent the Import operation for this specific object, so that the former version recorded within the spreadsheet file is kept unchanged.

The second choice is to click with the pointing device **105** on the "*Yes*" push-button **2630** to proceed with the Import operation for this specific object, that is to replace the current object version definition recorded in the spreadsheet file by the one defined as part of the export-import file.

The third choice is to click with the pointing device **105** on the "*Yes to All*" push-button **2629** to proceed with the Import operation for this specific object, but also for any other object which would also fall in the same type of conflict case.

Once the spreadsheet user has clicked with the pointing device **105** on one of the three push-buttons **2628**, **2629**, or **2630**, the frame **2631** disappears from the Scalable Template Import Manager Dialog Box **2620** with all the graphical objects it contains (labels, text boxes and push-buttons). When all the objects part of the set of selected objects (element formats or meta-element formats or element profiles or meta-element profiles or scalable templates) have been processed by the Import operation, the Scalable Template Import Manager Dialog Box **2620** is closed on the display device **106**, and the current spreadsheet file has been updated by the definitions imported from the export-import file.

- **7. Seventh Operation : Import / Export of Scalable Template Instance**

The seventh operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to share, through an import / export mechanism, a scalable template instance between a source spreadsheet file and

a destination spreadsheet file. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first selects a range of cells of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104**. This range of cells comprises the currently selected cell.

- **b. Scalable Template Instance Export Manager**
  Then the spreadsheet user invokes an original specific command called "***Scalable Template Instance Export Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to store in an Export/Import file the scalable template instance identified through the currently selected range of cells.

  When the ***Scalable Template Instance Export Manager*** command is invoked, a test is first performed to determine if the currently selected cell belongs or not to an existing scalable template instance.
  If it is not the case, then a conventional pop-up window is displayed on the display device **106** to inform the spreadsheet user that the currently selected cell must be located within an existing scalable template instance to enable the Instance Export operation.
  If it is the case, then the Scalable Template Instance Export Dialog Box **2700** is displayed on the display device **106**, as illustrated by the FIG **27A**. When first displayed, the Scalable Template Instance Export Dialog Box **2700** contains three informative dialog boxes and four push-buttons, leaving to the spreadsheet user the choice between different actions. The text boxes are
  - the "*Export File*" text box **2703** which displays the name of the spreadsheet instance export file, once specified (if not specified, the name of the spreadsheet instance export file defaults to an empty character string),

- the text box "*Instance Name*" **2704** which displays the name of the range of cells corresponding to the scalable template instance to which the currently selected cell belongs, and
- the "*Template Name*" **2705** text box which displays the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by.

If the "*Instance Name*" text box **2704** does not display a valid range of cells name (meaning that the range of cells corresponding to the scalable template instance containing the currently selected cell has not yet been named), then the two push-buttons:

- "*Export in a NEW file*" **2714**, and
- "*Export in an EXISTING file*" **2713**,

are disabled, so that any click with the pointing device **105** on them will not be recognised as a valid event.

Reversely if the "*Instance Name*" text box **2704** displays a valid range of cells name, then the two push-buttons

- "*Export in a NEW file*" **2714**, and
- "*Export in an EXISTING file*" **2713**,

are enabled, so that any click with the pointing device **105** on them will be recognised as a valid event.

The spreadsheet user can

- either cancel the Instance Export operation (by clicking with the pointing device **105** on the "*Cancel*" push-button **2702**), or
- start an Export operation in a new spreadsheet instance export-import file to be created (by clicking with the pointing device **105** on the "*Export in a NEW file*" push-button **2714** when enabled), or
- start an Export operation in an already existing spreadsheet instance export-import file to be selected (by clicking with the pointing device **105** on the "*Export in an EXISTING file*" push-button **2713** when enabled), or
- name or rename the range of cells corresponding to the scalable template instance to which the currently selected cell belongs (by clicking with the

pointing device **105** on the "*Name or Rename the Instance*," push-button **2712**).

If the "*Cancel*" push-button **2702** is clicked, then the Scalable Template Instance Export Dialog Box **2700** is closed and the Instance Export operation completes without any further action.

If the "*Name or Rename the Instance*" push-button **2712** is clicked, then a conventional range of cells naming dialog box is displayed on the display device **106** to let the spreadsheet user assign a name to the range of cells corresponding to the scalable template instance containing the currently selected cell. Any similar conventional means could also be used instead of the range of cells naming dialog box without departing from the spirit of the present invention.

If the "*Export in a NEW file*" push-button **2714** is enabled and clicked, then a conventional file creation dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, name and create a new file within a selected file directory. Any similar conventional means could also be used instead of the file creation dialog box without departing from the spirit of the present invention.

If the "*Export in an EXISTING file*" push-button **2713** is enabled and clicked, then a conventional file selection dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, and then select an existing file within a file directory. Any similar conventional means could also be used instead of the file selection dialog box without departing from the spirit of the present invention.

Once the existing file has been specified by the spreadsheet user, a test is performed to check if this file is a valid spreadsheet instance export-import file, and follows as such a pre-defined logical file structure.

If it is not the case, then the spreadsheet user is warned about this situation. To this effect a warning message is issued on the display device **106** through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation, and the spreadsheet user is then

invited through conventional prompting means such as an "*OK*" push-button, to acknowledge the warning. The warning message is then closed, so that the spreadsheet user can click again with the pointing device **105** on one of the four push-buttons **2702**, **2712**, **2713** and **2714** available within the Scalable Template Export Instance Manager Dialog Box **2700**.

If the user-specifed existing file is a correct spreadsheet instance export-import file, or if the user choice was to create a new spreadsheet instance export-import file, then the Scalable Template Instance Export Manager Dialog Box **2700** is updated as the text box **2703** displays the name of the spreadsheet instance export-import file.

Then the Instance Export operation is launched by copying-pasting by value, from the spreadsheet file towards the spreadsheet instance export-import file, every "IN" cell belonging to the scalable template instance containing the currently selected cell. If the spreadsheet instance export-import file was already containing the result of a previous instance export operation from a scalable template instance sharing the same name, then a conflict is possible.

If this situation arises, then the Scalable Template Instance Export Manager Dialog Box **2700** is completed with a set of information, all contained within the frame **2711**.

- First the date associated to the previous Instance Export operation found in the specified spreadsheet instance export-import file is displayed in the text box **2707**.
- Second the name of the file from which the previous instance has been exported in the specified spreadsheet instance export-import file is displayed in the text box **2708**.

By receiving all this information, the spreadsheet user can decide how to handle this conflict.

The first choice is to click with the pointing device **105** on the "*No*" push-button **2709** to prevent the Instance Export operation, so that the former exported instance recorded within the specified spreadsheet instance export-import file is kept unchanged.

The second choice is to click with the pointing device **105** on the "*Yes*" push-button **2710** to proceed with the Instance Export operation, that is to replace the current exported instance recorded in the spreadsheet instance export-import file by the one which will be derived from the current spreadsheet file.

Once the spreadsheet user has clicked with the pointing device **105** on one of the two push-buttons **2709**, or **2710**, the frame **2711** disappears from the Scalable Template Instance Export Manager Dialog Box **2700** with all the graphical objects it contains (labels, text boxes and push-buttons).

If not stopped by the spreadsheet user by a click on the "*No*" push-button **2709** as aforementioned, the progress of the Instance Export operation is reflected by the progress bar **2706** which graphically translates the portion of completed processing of the Instance Export operation. When the Instance Export operation is over, the Scalable Template Instance Export Manager Dialog Box **2700** is closed on the display device **106**, and the spreadsheet instance export-import file (either new or updated) is ready to be imported to another spreadsheet file.

- **c. Scalable Template Instance Import Manager**

Then the spreadsheet user moves to another electronic spreadsheet file and then invokes an original specific command called "***Scalable Template Instance Import Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to retrieve from a spreadsheet instance export-import file a scalable template instance.

When the ***Scalable Template Instance Import Manager*** command is invoked, a test is first performed to determine if the currently selected cell belongs or not to an existing scalable template instance.

If it is not the case, then a conventional pop-up window is displayed on the display device **106** to inform the spreadsheet user that the currently selected

cell must be located within an existing scalable template instance to enable the Instance Import operation.

If it is the case, then the Scalable Template Instance Import Dialog Box **2720** is displayed on the display device **106**, as illustrated by the FIG **27B**. When first displayed, the Scalable Template Instance Import Dialog Box **2720** contains three informative dialog boxes and three push-buttons, leaving to the spreadsheet user the choice between different actions. The text boxes are

- the "*Import File*" text box **2723** which displays the name of the spreadsheet instance Import file, once specified (if not specified, the name of the spreadsheet instance Import file defaults to an empty character string),
- the text box "*Instance Name*" **2724** which displays the name of the range of cells corresponding to the scalable template instance to which the currently selected cell belongs, and
- the "*Template Name*" **2725** text box which displays the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by.

If the "*Instance Name*" text box **2724** does not display a valid range of cells name (meaning that the range of cells corresponding to the scalable template instance containing the currently selected cell has not yet been named), then the push-button "*Select an Import File*" **2728** is disabled, so that any click with the pointing device **105** on it will not be recognised as a valid event.

Reversely if the "*Instance Name*" text box **272** displays a valid range of cells name, then the push-button "*Select an Import File*" **2728** is enabled, so that any click with the pointing device **105** on it will be recognised as a valid event.

The spreadsheet user can

- either cancel the Instance Import operation (by clicking with the pointing device **105** on the "*Cancel*" push-button **2722**), or
- start an Import operation from an already existing spreadsheet instance export-import file to be selected (by clicking with the pointing device **105** on the "*Select an Import File*" push-button **2728** when enabled), or

- name or rename the range of cells corresponding to the scalable template instance to which the currently selected cell belongs (by clicking with the pointing device **105** on the "*Name or Rename the Instance*," push-button **2727**).

If the "*Cancel*" push-button **2722** is clicked, then the Scalable Template Instance Import Dialog Box **2720** is closed and the Instance Import operation completes without any further action.

If the "*Name or Rename the Instance*" push-button **2727** is clicked, then a conventional range of cells naming dialog box is displayed on the display device **106** to let the spreadsheet user assign a name to the range of cells corresponding to the scalable template instance containing the currently selected cell. Any similar conventional means could also be used instead of the range of cells naming dialog box without departing from the spirit of the present invention.

If the "*Select an Import File*" push-button **2728** is enabled and clicked, then a conventional file selection dialog box is displayed on the display device **106** to let the spreadsheet user navigate within the existing file directory structure, and then select an existing file within a file directory. Any similar conventional means could also be used instead of the file selection dialog box without departing from the spirit of the present invention.

Once the existing file has been specified by the spreadsheet user, a test is performed to check if this file is a valid spreadsheet instance export-import file, and follows as such a pre-defined logical file structure.

If it is not the case, then the spreadsheet user is warned about this situation. To this effect a warning message is issued on the display device **106** through conventional means such as pop-up windows, status bar messages, or any other similar conventional means which can be used instead without departing from the spirit of the invention. This warning message informs the spreadsheet user about this situation, and the spreadsheet user is then invited through conventional prompting means such as an "*OK*" push-button, to acknowledge the warning. The warning message is then closed, so that the spreadsheet user can click again with the pointing device **105** on one of the

three push-buttons **2722**, **2727** and **2728** available within the Scalable Template Import Instance Manager Dialog Box **2720**.

If the user-specified existing file is a correct spreadsheet instance export-import file, then the Scalable Template Instance Import Manager Dialog Box **2720** is updated as the text box **2723** displays the name of the spreadsheet instance export-import file. Then the Instance Import operation is launched by copying-pasting by value, from the spreadsheet instance export-import file towards the current spreadsheet file, every "IN" cell belonging to the scalable template instance containing the currently selected cell. The progress of the Instance Import operation is reflected by the progress bar **2726** which graphically translates the portion of completed processing of the Instance Import operation. When the Instance Import operation is over, the Scalable Template Instance Import Manager Dialog Box **2720** is closed on the display device **106**, and the spreadsheet instance export-import file (either new or updated) is ready to be imported to another spreadsheet file.

In the specific case where the source spreadsheet file and the destination spreadsheet file are in fact the same spreadsheet file, the previous method and commands can be used identically. In this case, the proposed import-export method can be seen as an intelligent, scalable template minded way to perform a copy-and-paste operation from a source scalable template instance onto a destination scalable template instance belonging to the same spreadsheet file.

- **8. Eighth Operation : Reorganisation of Scalable Template Instance**

The eighth operation occurs when the spreadsheet user decides, based on his or her own criteria not detailed here, to use a sorting application available in electronic spreadsheet environments to reorganise a scalable template instance. In a preferred embodiment of the present invention, this operation comprises the following steps:

- **a.** The spreadsheet user first selects a range of cells of his/her choice by using conventional means, such as but not limited to the pointing device **105** or the keyboard **104.**

- **b. Scalable Template Instance Sort Application Manager**

  Then the spreadsheet user invokes an original specific command called "***Scalable Template Instance Sort Application Manager***" thanks to conventional means available in spreadsheet environment, such as but not limited to the pointing device **105** or the keyboard **104**, in order to sort part or totality of a scalable template instance identified by the currently selected range of cells.

  When the ***Scalable Template Instance Sort Application Manager*** command is invoked, a test is first performed to determine if the currently selected range of cells overlaps or not (totally or partially) one or several existing scalable template instances.

  If it is not the case, then the conventional sorting application available in electronic spreadsheet environments is invoked to sort the currently selected range of cells.

  If it is the case, then a second test is performed to determine if the currently selected cell belongs or not to an existing scalable template instance.

  If it is not the case, then a conventional sorting application will be possible, at the cost of corrupting the existing scalable template instances which overlap with the currently selected range of cells.

  If it is the case, then three different modes of sorting become possible.

  The first sorting mode is the "RANGE" mode which corresponds to the conventional sorting application where the currently selected range of cells is sorted according to user-specified parameters. With this first mode, any existing scalable template instance overlapping with the sorted range of cells will be corrupted.

  The second sorting mode is the "ELEMENT" mode where the range of cells to be sorted corresponds to the elements which on one side are part of the scalable

template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells.

The third sorting mode is the "INSTANCE" mode where the range of cells to be sorted corresponds to the whole body part of the scalable template instance to which the currently selected cell belongs (in other words it corresponds to all the elements defined within this scalable template instance).

To determine which sorting mode to use, the Scalable Template Instance Sort Manager Dialog Box **2920** is displayed on the display device **106**, as illustrated by FIG **29B**. This Scalable Template Instance Sort Manager Dialog Box **2920** contains some pieces of information which relate to the sorting application.

First the name of the scalable template that the scalable template instance to which the currently selected cell belongs, abides by, is displayed in the label box **2931** (if such a scalable template instance does not exist, then the label box **2931** displays the reserved name "NONE").

Second the sorting mode is specified by the presence of a black point within one of the three option buttons "*Sort as a range of cells*" **2930**, "*Sort as elements*" **2929**, and "*Sort as an Instance*" **2928**, respectively corresponding to the sorting modes "RANGE", "ELEMENT" and "INSTANCE". If the spreadsheet user wishes to change the default sorting mode which is "RANGE" in a preferred embodiment of the present invention, or a previously changed sorting mode, then he/she uses the pointing device **105** to click on one of the three option buttons

- "*Sort as a range of cells*" **2930**,
- "*Sort as elements*" **2929**, and
- "*Sort as an Instance*" **2928**,

which will display alone a black point specifying the new selected sorting mode.

Third the push-button "*Cancel*" **2922** or the closing-window push-button **2921** allow to close the Scalable Template Instance Sort Manager Dialog Box **2920**

without further action. By clicking with the pointing device **105** on one of these two push-buttons **2921** and **2922**, the Scalable Template Instance Sort Manager Dialog Box **2920** is closed and the sorting application is aborted.

Fourth the push-button "Sort" **2923**, when clicked with the pointing device **105** by the spreadsheet user, is the trigger launching the sorting application. This push-button "*Sort*" **2923** is enabled (meaning that the method recognises the click event with the pointing device **105** on this push-button "*Sort*" **2923**) when the sorting application is possible. The fact that this sorting application is possible or not depends on different factors:

- the position of the currently selected cell within an existing scalable template instance,
- the overlap of the currently selected range of cells with existing scalable template instance(s), the sorting mode, and
- the presence of any existing critical scalable template instance which would be corrupted due to the sorting application.

The possibility to perform or not the sorting application according to the sorting mode specified by one of the three option buttons **2930**, **2929**, and **2928**, is reflected by several label boxes, taking the values "YES" or "NO", which are part of the Scalable Template Instance Sort Manager Dialog Box **2920**.

The two label boxes **2932** and **2933** reflect for the sorting mode "RANGE" if the sorting application may lead to corrupt any existing critical scalable template instance (label box **2932**), or may lead to corrupt any other existing scalable template instance (label box **2933**).

As soon as the value "YES" (respectively "NO") is taken by the **2932** label box, the label box **2925** located in the "*Possible*" column **2924** takes the value "NO" (respectively "YES") reflecting that the sorting mode "RANGE" is not possible.

The label box **2926** takes the value "YES" as soon as the currently selected cell is located within an existing scalable template instance, so that the "ELEMENT" sorting mode is possible.

The label box **2927** takes the value "YES" as soon as the currently selected cell is located within an existing scalable template instance, so that the "INSTANCE" sorting mode is possible. As soon as the value "NO" is taken

- by **2925** label box when the option button **2930** displays a black point, or
- by the **2926** label box when the option button **2929** displays a black point, or
- by the **2927** label box when the option button **2928** displays a black point,

then the sorting application is considered as impossible, so that the "*Sort*" push-button **2923** gets disabled.

Reversely, if the value "YES" is displayed instead of the value "NO", then the sorting application is possible, so that the "*Sort*" push-button **2923** gets enabled. When the "*Sort*" push-button **2923** is enabled and clicked with the pointing device **105** by the spreadsheet user, the selected sorting mode is used to determine how to reshape the currently selected range of cells.

If the selected sorting mode is the "RANGE" mode (option button **2930** displaying a black point), then the currently selected range of cells is kept as is.

If the selected sorting mode is the "ELEMENT" mode (option button **2929** displaying a black point), then the currently selected range of cells is reshaped to correspond to the elements which on one side are part of the scalable template instance to which the currently selected cell belongs, and which on the other side occupy the rows of the currently selected range of cells.

If the selected sorting mode is the "INSTANCE" mode (option button **2928** displaying a black point), then the currently selected range of cells is reshaped to correspond to the whole body part of the scalable template instance to which the currently selected cell belongs.

Once the reshape is done, a conventional sorting application is invoked for the reshaped range of cells, so that the spreadsheet user can first specify through conventional means (such as clicking with the pointing device **105** on push-buttons, options buttons, check boxes, or any other equivalent dialog box components) the conventional options available in electronic spreadsheet environments for sorting ranges of cells. Such options are for instance

- the possibility to exclude or include the first row of the selected range of cells, or
- the possibility to perform an ascending or descending sorting operation, or

- the possibility to update the sorting criteria in terms of prioritised column sequence.

Once the spreadsheet user has specified the sorting application options, then this sorting application is performed on the reshaped range of cells, according to the specified options. Upon completion of this conventional sorting application, the Scalable Template Instance Sort Manager Dialog Box **2920** is closed to complete the processing of the ***Scalable Template Instance Sort Application Manager*** command.

E.METHODS

E1. Scalable Template Manager method

The method for managing element formats, meta-elements formats, element profiles, meta-element profiles and scalable templates used in the preferred embodiment of the present invention is summarised in flowchart **800** of FIG **8**. This method can be seen as the processing of the ***Scalable Template Manager*** command.

- At step **801**, the method is in its default state, waiting for an event to initiate the process.

- At step **802**, the ***Scalable Template Manager*** command is detected, as a result of a user action. This action can be for instance:
  - a specific combination of key on the keyboard **104**, or
  - the click of the pointing device **105** on a specific button, or
  - any other similar means not further specified here.

- At step **803**, some local variables are initialised:
  - the local variable *STM_select* is set to the value 0 (zero),
  - the local variable *STM_new* is set to the value "NONE",
  - the local variable *STM_range* is set to the value "NO", and
  - the local variable *STM_index* is set to the value 1 (one).

- At step **804**, the three tables EFT **700**, EPT **710**, and STT **720** are parsed to derive the table STMT **730**. For each respective record **701**, or **711**, or **721** found in one of these three tables, is created a new record **731** within the STMT table **730**.

Referring now to FIG **7A**, **7B**, **7C**, and **7D**, this construction is done by copying in sequence all the fields defined in the record **701** ("*Name*" field **702**, "*Last Change Date*" field **703**, "*Description Ptr*" field **704**, "*Row #*" field **705**, "*Column #*" field **706** and "*Type*" field **707**) or in the record **711** ("*Name*" field **712**, "*Last Change Date*" field **713**, "*Description Ptr*" field **714**, "*Row #*" field **715**, "*Column #*" field **716** and "*Type*" field **717**), or in the record **721** ("*Name*" field **722**, "*Last Change Date*" field **723**, "*Description Ptr*" field **724**, "*Min Element #*" field **725**, "*Max Element #*" field **726** and "*Type*" field **727**) onto the corresponding fields of the record **731** ("*Name*" field **732**, "*Last Change Date*" field **733**, "*Description Ptr*" field **734**, "*Info Field 1*" field **735**, "*Info Field 2*" field **736** and "*Type*" field **737**), then by initialising in the "*Type*" field **737** the "SELECTED" attribute **742** to "NO" and the "NATURE" attribute **741** to the values "FORMAT", or "PROFILE" or "TEMPLATE" if the record **731** has been respectively copied from a record **701**, or **711**, or **721**, and then by initialising the last field "*Index*" **738** with the value of a counter which increments for each new record and which starts with the value 1 (one).

- At step **805**, the Scalable Template Manager Dialog Box **600** is displayed on the display device **106**.
  - The "Name" information appearing on the top of the list box **613** corresponds to the "*Name*" field **732** of the record **731** in the STMT table **730** whose "*Index*" field **738** is equal to the local variable *STM_index*. Underneath "Name" information's within this list box **613** correspond to the "*Name*" field **732** of the following records **731** of the STMT table **730**.
  - The "Type" information appearing on the top of the list box **614** is derived from the "*Type*" field **737** (attributes "NATURE" **741** and "META" **739**) of the record **731** in the STMT table **730** whose "*Index*" field **738** is equal to the local variable *STM_index*. Underneath "Type" information's within this list box **613**

are derived from the "*Type*" field **737** (attributes "NATURE" **741** and "META" **739**) of the following records **731** of the STMT table **730**.

- The "Modified" information appearing on the top of the list box **602** corresponds to the "*Last Change Date*" field **733** of the record **731** in the STMT table **730** whose "*Index*" field **738** is equal to the local variable *STM_index*. Underneath "Modified" information's within this list box **613** correspond to the "*Last Change Date*" field **733** of the following records **731** of the STMT table **730**.
- The check box **612** is filled with a check mark if the "*Type*" field **737** of the record **731** in the STMT table **730** whose "*Index*" field **738** is equal to the local variable *STM_index* has the "SELECTED" attribute **742** equal to "YES". Underneath check boxes on the left of the list box **613** are also derived from the "*Type*" field **737** ("SELECTED" attribute **742**) of the following records **731** of the STMT table **730**.
- The option button "Format" **617** displays a black point if and only if the local variable *STM_new* is equal to "FORMAT". The option button "Profile" **609** displays a black point if and only if the local variable *STM_new* is equal to "PROFILE". The option button "Template" **616** displays a black point if and only if the local variable *STM_new* is equal to "TEMPLATE".
- The check box "From current selection" **608** displays a check mark if and only if the local variable *STM_range* is equal to "YES".

- At step **806**, the method is waiting for any user action on the Scalable Template Manager Dialog Box **600**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **807**, a user action on the Scalable Template Manager Dialog Box **600** is detected.
  - If the user action is a click on the push-button "Delete" **607**, then control is given to step **808**;

- if the user action is a click on the push-button "Import" **605**, then control is given to step **810**;
- if the user action is a click on the push-button "Done" **601** or on the closing-window push-button **615**, then control is given to step **834**;
- if the user action is a click on the push-button "Export" **606**, then control is given to step **811**;
- if the user action is a click on the scrolling bar **603**, either on the up direction or on the down direction, then control is given to step **814**;
- if the user action is a click on the option buttons "Format" **617**, or "Profile" **609**, or "Template" **616**, then control is given to step **815**;
- if the user action is a click on the check box "From current selection" **608**, then control is given to step **816**;
- if the user action is a click on a top check box like the check box **612**, then control is given to step **817**;
- if the user action is a click on the push-button "Instanciate" **604**, then control is given to step **830**;
- if the user action is a click on the push-button "Edit" **611**, then control is given to step **824** and;
- if the user action is a click on the push-button "Create New" **610**, then control is given to step **818**.

- At step **808**, a test is performed on each of the records **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", to determine if this same "*Type*" field **737** has the "REFERENCED" attribute **740** equal to "TEMPLATE" or "INSTANCE".
  - If it is the case, then control is given to step **835** (meaning that at least one record **731** of the STMT table **730** previously selected was referenced by a scalable template or by a scalable template instance);
  - otherwise control is given to step **809**.

- At step **809**, each respective record **701**, **711**, and **721** is removed from the EFT table **700**, EPT table **710**, and STT table **720** if the corresponding respective

"*Name*" field **702**, **712**, and **722** matches the "*Name*" field **732** of a record **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", as resulting from the step **817**. Then the local variable *STM_select* is reset to the value 0 (zero). Then control is given to the step **804** for rebuilding the STMT table.

- At step **810**, the ***Scalable Template Import Manager*** command is issued and then control is given to step **834**.

- At step **811**, a test is performed to determine if the local variable *STM_select* is equal to 0 (zero).
  - If it is the case, then control is given to step **813**;
  - otherwise control is given to step **812**.

- At step **812**, the ***Scalable Template Export Manager*** command is issued and then control is given to step **834**.

- At step **813**, a warning message notification is issued for informing the user that at least one object must be selected prior clicking on the "Export" push-button **606**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **805**.

- At step **814**, the local variable *STM_index* is either incremented or decremented by 1 (one) according to the direction (up or down) specified by the pointing device **105** on the scrolling bar **603**, and as long as it value remains positive and less than or equal to the number of records **731** defined within the STMT table **730**. Then control is given to step **805**.

- At step **815**, the local variable *STM_new* is updated to reflect the option button hit by the user with the pointing device **105**.
  - If the user has clicked on the "Format" option button **617**, then the local variable *STM_new* takes the value "FORMAT".
  - If the user has clicked on the "Profile" option button **609**, then the local variable *STM_new* take the value "PROFILE".
  - If the user has clicked on the "Template" option button **616**, then the local variable take the value "TEMPLATE".

  Then control is given to step **805**.

- At step **816**, the local variable *STM_range* is updated, so that its value swaps between "YES" and "NO". In addition, a check mark is respectively added within or removed from the check box **606** if it was previously absent or present in this same check box **606**. Then control is given to step **805**.

- At step **817**, the method updates the value of the "*Type*" field **737** of the record **731** within the STMT table **730**, whose "*Name*" field **732** is found equal to the character string located within the list box **613** immediately on the right of the check box on which the user has just clicked.

  If the previous value of this "*Type*" field **737** had the "SELECTED" attribute **742** equal to "YES", then the value update consists in turning this "SELECTED" attribute **742** to "NO" ; reversibly if the previous value of the "SELECTED" attribute **742** was equal to "NO", then the value update consists in turning this "SELECTED" attribute **742** to "YES".

  In the first case the local variable *STM_select* is decremented by 1, and in the second case the local variable *STM_select* is incremented by 1.

  Furthermore in the first case the check mark previously present in the check box on which the user has just clicked is removed from this check box and in the second case a check mark is displayed in the check box on which the user has just clicked. Then control is given to step **805**.

- At step **818**, a test is performed to determine if the local variable *STM_new* is equal to "NONE". If it is the case, then control is given to step **819**; otherwise control is given to step **820**.

- At step **819**, a warning message notification is issued for informing the user that at least one option ("Format" option button **617**, or "Profile" option button **609**, or "Template" option button **616**) must be selected prior clicking on the "Create New" push-button **610**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **805**.

- At step **820**, a test is performed to determine the value taken by the local variable *STM_new*.
  - If found equal to "FORMAT", then control is given to step **821**;
  - If found equal to "PROFILE", then control is given to step **822**;
  - If found equal to "TEMPLATE", then control is given to step **823**.

- At step **821**, the ***Element Format Editor*** command is issued with passing two parameters ("NEW" ; *STM_range*) and then control is given to step **834**.

- At step **822**, the ***Element Profile Editor*** command is issued with passing two parameters ("NEW" ; *STM_range*) and then control is given to step **834**.

- At step **823**, the ***Scalable Template Editor*** command is issued with passing one parameter ("NEW") and then control is given to step **834**.

- At step **824**, a test is performed to determine if the local variable *STM_select* is equal to 1 (one). If it is the case, then control is given to step **825**; otherwise control is given to step **829**.

- At step **825**, a test is performed to determine the nature of the selected object, as specified by the "*Type*" field **737** "NATURE" attribute **741** of the corresponding record **731** of the STMT table **730**.
  - If found equal to "FORMAT", then control is given to step **826**;
  - if found equal to "PROFILE", then control is given to step **827**;
  - if found equal to "TEMPLATE", then control is given to step **828**.

- At step **826**, the ***Element Profile Editor*** command is issued with passing one parameter equal to the "*Name*" field **732** of the unique record **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", and then control is given to step **834**.

- At step **827**, the ***Element Format Editor*** command is issued with passing one parameter equal to the "*Name*" field **732** of the unique record **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", and then control is given to step **834**.

- At step **828**, the ***Scalable Template Editor*** command is issued with passing one parameter equal to the "*Name*" field **732** of the unique record **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", and then control is given to step **834**.

- At step **829**, a warning message notification is issued for informing the user that a single object must be selected within the Scalable Template Manager Dialog Box (thanks to check boxes like **612**) prior clicking on the "Edit" push-button **611** or on the "Instanciate" push-button **604**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification

message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **805**.

- At step **830**, a test is performed to determine if the local variable *STM_select* is equal to 1 (one). If it is the case, then control is given to step **831**; otherwise control is given to step **829**.

- At step **831**, a test is performed to determine the nature of the selected object, as specified by the "*Type*" field **737** "NATURE" attribute **741** of the corresponding record **731** of the STMT table **730**. If found equal to "TEMPLATE", then control is given to step **832**; otherwise control is given to step **833**.

- At step **832**, the ***Scalable Template Instanciator*** command is issued with passing one parameter equal to the "*Name*" field **732** of the unique record **731** of the STMT table **730** whose "*Type*" field **737** has the "SELECTED" attribute **742** equal to "YES", and then control is given to step **834**.

- At step **833**, a warning message notification is issued for informing the user that a single scalable template object must be selected within the Scalable Template Manager Dialog Box (thanks to check boxes like **612**) prior clicking on the "Instanciate" push-button **604**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **805**.

- At step **834**, the Scalable Template Manager Dialog Box **600** is closed so that it disappears from the display device **106** and then control is given back to the

initial step **801** for processing any future ***Scalable Template Manager*** command.

- At step **835**, a warning message notification is issued for informing the user that at least one selected object to be deleted is referenced by another object. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Then the user is prompted to either cancel the current "Delete" operation, or to pursue it. This can typically be done by displaying on the display device **106** a prompting message in a pop-up window, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has made his choice through conventional means such as clicking with the pointing device **105** on an "Cancel" or "Continue" push-button present within a prompting message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **805** if the spreadsheet user decision is to cancel the "Delete" operation, or to step **809** if the spreadsheet user decision is to continue the "Delete" operation.

E2. Element Format Editor method

The method for creating or updating element formats or meta-element formats used in the preferred embodiment of the present invention is summarised in flowchart **900** of FIG **9**. This method can be seen as the processing of the ***Element Format Editor*** command.

- At step **901**, the method is in its default state, waiting for an event to initiate the process.

- At step **902**, the ***Element Format Editor*** command is detected, as a result of an user action. This action can be for instance:
  - a specific combination of key on the keyboard **104**, or
  - the click of the pointing device **105** on a specific button, or
  - any other similar means not further specified here.

- At step **903**, the parameters of the command are retrieved. They correspond to:
  - a first mandatory parameter *EFE_name* which can either take a reserved value "NEW" or another value corresponding to a character string name, as found in the "*Name*" field **732** of a record **731** within the STMT table **730**; and
  - a second optional parameter *EFE_range* which can take only two predefined values "YES" and "NO". This second optional parameter must be present when the first mandatory parameter value differs from the "NEW".

  These two parameters are recorded as local variables.

- At step **904**, some local variables are initialised: the local variable *EFE_meta* is set to the value "NO", the local variable *EFE_size* is set to the value 8 (eight).

- At step **905**, a test is performed to determine the value taken by the local variable *EFE_name*. If found equal to "NEW", then control is given to step **909**; otherwise control is given to step **906**.

- At step **906**, the EFT table **700** is looked up to locate a record **701** whose "*Name*" field **702** is found equal to the value taken by the local variable *EFE_name*. If such a record is found, then control is given to step **908**; otherwise control is given to step **907**.

- At step **907**, an exception handler is invoked to treat this "should not occur" condition. Such operation is implementation dependent and can take different forms such as the display on the display device **106** of an error message pop-up window. Then control is given to step **925**.

- At step **908**,
  - the local variable *EFE_meta* is set to the value "YES" or "NO" according to the value of the "META" attribute **708** within the "*Type*" field **707** of the record **701** found at step **906**,
  - the local variable *EFE_size* is set to the value found in the "*Column #*" field **706** of the record **701** found at step **906**, and

- the memory location pointed by the "*Description Ptr*" field **704** of the record **701** found at step **906** is copied onto the clipboard.

Then control is given to step **912**.

- At step **909**, a new name for the newly created format is determined, according to a name string taking in a preferred embodiment of the present invention the form "New XX" where XX corresponds to a counter value ensuring the name uniqueness with respect to all the names previously defined and recorded in the "*Name*" fields **702**, **712** and **722** found in the respective records **701**, **711** and **721** of the respective tables EFT **700**, EPT **710** and STT **720**. Any other similar conventional means could be used instead without departing from the spirit of the invention, as long as the uniqueness of the newly created name is ensured.

Then the new name is recorded in the local variable *EFE_name*. Then memory space is allocated within the main memory **102** to later record the illustrative range of cells for the element format or meta-element format. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file.

Then a new record **701** is created in the EFT table **700**, and this new record **701** is initialised as follows:

- the "*Name*" field **702** is set to the value of the local variable *EFE_name* ;
- the "*Last Change Date*" field **703** is set to the system time reference, as known by the central processor **101** ;
- the "*Description Ptr*" field **704** is set to the memory location which has just been allocated ;
- the "*Row #*" field **705** is set to the value 1 (as in the preferred embodiment of the present invention the scalable templates are managed in a 2D environment; this field would carry the number of defined rows for the created format in a 3D environment) ;
- the "*Column #*" field **706** is set to the value of the local variable *EFE_size* ; and
- the "*Type*" field **707** is set as follows: the attribute "META" **708** is set equal to the value of the local variable *EFE_meta*, and the attribute "REFERENCED" **709** is set to "NONE".

Then control is given to step **910**.

- At step **910**, a test is performed to determine the value taken by the local variable *EFE_range*. If found equal to "YES", then control is given to step **911**; otherwise control is given to step **912**.

- At step **911**, the currently selected range of cells is copied onto the clipboard and the local variable *EFE_size* is set equal to the number of columns of the selected range.

- At step **912**, the "Editor Space" sheet **635** is made the current sheet and the content of the clipboard is pasted on this blank sheet at a fixed cell address **634** (address B2 in a preferred embodiment of the present invention, as shown on FIG **6B**), so that the user can visualise on the display device **106**, within the window **160** an illustration of the element format or meta-element format.

- At step **913,** the Element Format Editor Dialog Box **621** is displayed on the display device **106**.
  - The label box **624** is initialised with the value of the local variable *EFE_name*.
  - The top (respectively bottom) option button **630** is filled with a black point if the local variable *EFE_meta* is found equal to "NO" (respectively "YES").
  - The text box **626** is filled with the value of the local variable *EFE_size*.
  - The push-buttons "*Save*" **632** and "*Save & Refresh*" **628** are enabled if the local variable *EFE_size* is found equal to the "*Column #*" field **706** of the current record **701**, or if the attribute "REFERENCED" **709** within the "*Type*" field **707** of this same record **701** is found equal to "NO", so that any future click with the pointing device **105** on one of these two push-buttons "*Save*" **632** and "*Save & Refresh*" **628** will be recognised as a valid event.
  - The push-buttons "*Save*" **632** and "*Save & Refresh*" **628** are disabled otherwise (local variable *EFE_size* is not found equal to the "*Column #*" field **706** of the current record **701**, and the attribute "REFERENCED" **709** within the "*Type*" field **707** of this same record **701** is not found equal to "NO"), so that

any future click with the pointing device **105** on one of these two push-buttons "*Save*" **632** and "*Save & Refresh*" **628** will not be recognised as an event.

- At step **914**, the method is waiting for any user action on the Element Format Editor Dialog Box **621**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **915**, a user action on the Element Format Editor Dialog Box **621** is detected.
  - If the user action is a click on the push-button "Save & Refresh" **628**, then control is given to step **916**;
  - if the user action is a click on the push-button "Save" **632**, then control is given to step **917**;
  - if the user action is a click on the push-button "Save As" **631**, then control is given to step **918**;
  - if the user action is a click on the push-button "Clear" **629**, then control is given to step **919**;
  - if the user action is a click on the spin button **627**, then control is given to step **920**;
  - if the user action is a click on one of the two option buttons **630**, then control is given to step **921**;
  - if the user action is a click on the push-button "Done" **623**, or on the closing-window push-button **622**, then control is given to step **925**.

- At step **916**, the EFT table **700** is updated and saved as part of the electronic spreadsheet file by refreshing the record **701** whose "*Name*" field **702** is equal to the local variable *EFE_name*. For this purpose,
  - the "*Last Change Date*" field **703** is set to the system time reference, as known by the central processor **101** ;
  - the "*Column #*" field **706** is set to the value of the local variable *EFE_size* ; and

- the "*Type*" field **707** is set as follows: the attribute "META" **708** is set equal to the value of the local variable *EFE_meta*.

In addition the range of cells **634** illustrating on the "Editor Space" sheet **635** the current definition of the element format or meta-element format is copied onto the memory location pointed by the "*Description Ptr*" field **704**. Then control is given to step **922**.

- At step **917**, the EFT table **700** is updated and saved as part of the electronic spreadsheet file by refreshing the record **701** whose "*Name*" field **702** is equal to the local variable *EFE_name*. For this purpose,
  - the "*Last Change Date*" field **703** is set to the system time reference, as known by the central processor **101** ;
  - the "*Column #*" field **706** is set to the value of the local variable *EFE_size* ; and
  - the "*Type*" field **707** is set as follows: the attribute "META" **708** is set equal to the value of the local variable *EFE_meta*.

In addition the range of cells **634** illustrating on the "Editor Space" sheet **635** the current definition of the element format or meta-element format is copied onto the memory location pointed by the "*Description Ptr*" field **704**. Then control is given to step **913**.

- At step **918**, a test is performed on the value found in the text box **625** to determine if it corresponds to a valid new name. The corresponding criteria are implementation dependent and may take different forms without departing from the spirit of the invention, as long as the new proposed name is a unique character string against all the already defined names recorded in the "*Name*" fields **702**, **712**, and **722**. If validity and uniqueness are proven, then control is given to step **923**; otherwise control is given to step **924**.

- At step **919**, the default attributes currently defined in the spreadsheet environment are applied to the "Editor Space" sheet **635**, so that the displayed illustration of the element format or meta-element format receives these same default attributes. Then control is given to the step **913**.

- At step **920**, the local variable *EFE_size* is either incremented or decremented by 1 (one) according to the direction (up or down) specified by the pointing device **105** on the spin button **627**, and as long as it value remains positive and less than or equal to an upper limit set equal to 254 in a preferred embodiment of the present invention. Then control is given to step **913**.

- At step **921**, the local variable *EFE_meta* is updated, so that its value becomes "YES" (respectively "NO") if the bottom (respectively top) option button **630** has been clicked on. Then control is given to step **913**.

- At step **922**, the ***Scalable Template Refresh Manager*** command is issued with the following parameters: *EFE_name*, "FORMAT" and then control is given to step **913**.

- At step **923**, memory space is allocated within the main memory **102** to later record the illustrative range of cells for the element format or meta-element format. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file. Then a new record **701** is created in the EFT table **700** which is saved as part of the electronic spreadsheet file, and this new record **701** is initialised as follows:
  - the "*Name*" field **702** is set to the value found in the text box **625** and validated at step **918**;
  - the "*Last Change Date*" field **703** is set to the system time reference, as known by the central processor **101** ;
  - the "*Description Ptr*" field **704** is set to the memory location which has just been allocated ;
  - the "*Row #*" field **705** is set to the value 1 (as in the preferred embodiment of the present invention the scalable templates are managed in a 2D environment; this field would carry the number of defined rows for the created format in a 3D environment) ;
  - the "*Column #*" field **706** is set to the value of the local variable *EFE_size* ; and

- the "*Type*" field **707** is set as follows: the attribute "META" **708** is set equal to the value of the local variable *EFE_meta*, and the attribute "REFERENCED" **709** is set to "NONE".

Then control is given to step **913**.

- At step **924**, a warning message notification is issued for informing the user that a valid and unique name must be specified in the text box **625** prior to clicking on the "Save As" push-button **631**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **913**.

- At step **925**, the Element Format Editor Dialog Box **661** is closed so that it disappears from the display device **106**, then the "Editor Space" sheet **675** is removed from the window **160** so that it is replaced by the original sheet present at ***Element Format Editor*** invocation time. Finally control is given back to the initial step **901** for processing any future ***Element Format Editor*** command.

E3. Element Profile Editor method

The method for creating or updating element profiles or meta-element profiles used in the preferred embodiment of the present invention is summarised in flowchart **1000** of FIG **10**. This method can be seen as the processing of the ***Element Profile Editor*** command.

- At step **1001**, the method is in its default state, waiting for an event to initiate the process.

- At step **1002**, the ***Element Profile Editor*** command is detected, as a result of an user action. This action can be for instance:
  - a specific combination of key on the keyboard **104**, or
  - the click of the pointing device **105** on a specific button, or
  - any other similar means not further specified here.

- At step **1003**, the parameters of the command are retrieved. They correspond to:
  - a first mandatory parameter *EPE_name* which can either take a reserved value "NEW" or another value corresponding to a character string name, as found in the "*Name*" field **732** of a record **731** within the STMT table **730**; and
  - a second optional parameter *EPE_range* which can take only two predefined values "YES" and "NO". This second optional parameter must be present when the first mandatory parameter value differs from the "NEW".

  These two parameters are recorded as local variables.

- At step **1004**, some local variables are initialised: the local variable *EPE_meta* is set to the value "NO", the local variable *EPE_size* is set to the value 8 (eight).

- At step **1005**, a test is performed to determine the value taken by the local variable *EPE_name*. If found equal to "NEW", then control is given to step **1009**; otherwise control is given to step **1006**.

- At step **1006**, the EPT table **710** is looked up to locate a record **711** whose "*Name*" field **712** is found equal to the value taken by the local variable *EPE_name*. If such a record is found, then control is given to step **1008**; otherwise control is given to step **1007**.

- At step **1007**, an exception handler is invoked to treat this "should not occur" condition. Such operation is implementation dependent and can take different forms such as the display on the display device **106** of an error message pop-up window. Then control is given to step **1025**.

- At step **1008**,

- the local variable *EPE_meta* is set to the value "YES" or "NO" according to the value of the "META" attribute **718** within the "*Type*" field **717** of the record **711** found at step **1006**,
- the local variable *EPE_size* is set to the value found in the "*Column #*" field **716** of the record **711** found at step **1006**, and
- the memory location pointed by the "*Description Ptr*" field **714** of the record **711** found at step **1006** is copied onto the clipboard and within the local variable *EPE_Desc*.

Then control is given to step **1012**.

- At step **1009**, a new name for the newly created profile is determined, according to a name string taking in a preferred embodiment of the present invention the form "New XX" where XX corresponds to a counter value ensuring the name uniqueness with respect to all the names previously defined and recorded in the "*Name*" fields **702**, **712** and **722** found in the respective records **701**, **711** and **721** of the respective tables EFT **700**, EPT **710** and STT **720**. Any other similar conventional means could be used instead without departing from the spirit of the invention, as long as the uniqueness of the newly created name is ensured.

Then the new name is recorded in the local variable *EPE_name*.

Then memory space is allocated within the main memory **102** to later record the illustrative range of cells for the element profile or meta-element profile. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file. Then a new record **711** is created in the EPT table **710**, and this new record **711** is initialised as follows:

- the "*Name*" field **712** is set to the value of the local variable *EPE_name* ;
- the "*Last Change Date*" field **713** is set to the system time reference, as known by the central processor **101** ;
- the "*Description Ptr*" field **714** is set to the memory location which has just been allocated ;
- the "*Row #*" field **715** is set to the value 1 (as in the preferred embodiment of the present invention the scalable templates are managed in a 2D environment; this field would carry the number of defined rows for the created profile in a 3D environment) ;

- the "*Column #*" field **716** is set to the value of the local variable *EPE_size* ; and
- the "*Type*" field **717** is set as follows: the attribute "META" **718** is set equal to the value of the local variable *EPE_meta*, and the attribute "REFERENCED" **719** is set to "NONE".

Then control is given to step **1010**.

- At step **1010**, a test is performed to determine the value taken by the local variable *EPE_range*. If found equal to "YES", then control is given to step **1011**; otherwise control is given to step **1012**.

- At step **1011**, the currently selected range of cells is copied onto the clipboard and the local variable *EPE_size* is set equal to the number of columns of the selected range.

- At step **1012**, the "Editor Space" sheet **635** is made the current sheet and the content of the clipboard is pasted on this blank sheet at a fixed cell address **634** (address B2 in a preferred embodiment of the present invention, as shown on FIG **6B**), so that the user can visualise on the display device **106**, within the window **160** an illustration of the element profile or meta-element profile.

- At step **1013**, the Element Profile Editor Dialog Box **641** is displayed on the display device **106**.
  - The label box **644** is initialised with the value of the local variable *EPE_name*. The top (respectively bottom) option button **650** is filled with a black point if the local variable *EPE_meta* is found equal to "NO" (respectively "YES").
  - The text box **646** is filled with the value of the local variable *EPE_size*.
  - The push-buttons "*Save*" **652** and "*Save & Refresh*" **648** are enabled if the local variable *EPE_size* is found equal to the "*Column #*" field **716** of the current record **711**, or if the attribute "REFERENCED" **719** within the "*Type*" field **717** of this same record **711** is found equal to "NO", so that any future click with the pointing device **105** on one of these two push-buttons "*Save*" **652** and "*Save & Refresh*" **648** will be recognised as a valid event.

- The push-buttons "*Save*" **652** and "*Save & Refresh*" **648** are disabled otherwise (local variable *EPE_size* is not found equal to the "*Column #*" field **716** of the current record **711**, and the attribute "REFERENCED" **719** within the "*Type*" field **717** of this same record **711** is not found equal to "NO"), so that any future click with the pointing device **105** on one of these two push-buttons "*Save*" **652** and "*Save & Refresh*" **648** will not be recognised as an event.

- At step **1014**, the method is waiting for any user action on the Element Profile Editor Dialog Box **641**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1015**, a user action on the Element Profile Editor Dialog Box **641** is detected.
  - If the user action is a click on the push-button "Save & Refresh" **648**, then control is given to step **1016**;
  - if the user action is a click on the push-button "Save" **652**, then control is given to step **1017**;
  - if the user action is a click on the push-button "Save As" **651**, then control is given to step **1018**;
  - if the user action is a click on the push-button "Clear" **649**, then control is given to step **1019**;
  - if the user action is a click on the spin button **647**, then control is given to step **1020**;
  - if the user action is a click on one of the two option buttons **650**, then control is given to step **1021**;
  - if the user action is a click on the push-button "Done" **643**, or on the closing-window push-button **642**, then control is given to step **1025**.

- At step **1016**, the EPT table **710** is updated and saved as part of the electronic spreadsheet file by refreshing the record **711** whose "*Name*" field **712** is equal to the local variable *EPE_name*. For this purpose,

- the "*Last Change Date*" field **713** is set to the system time reference, as known by the central processor **101** ;
- the "*Column #*" field **716** is set to the value of the local variable *EPE_size* ; and
- the "*Type*" field **717** is set as follows: the attribute "META" **718** is set equal to the value of the local variable *EPE_meta*.

In addition the range of cells **654** illustrating on the "Editor Space" sheet **655** the current definition of the element profile or meta-element profile is copied onto the memory location pointed by the "*Description Ptr*" field **714**. Then control is given to step **1022**.

- At step **1017**, the EPT table **710** is updated and saved as part of the electronic spreadsheet file by refreshing the record **711** whose "*Name*" field **712** is equal to the local variable *EPE_name*. For this purpose,
  - the "*Last Change Date*" field **713** is set to the system time reference, as known by the central processor **101** ;
  - the "*Column #*" field **716** is set to the value of the local variable *EPE_size* ; and
  - the "*Type*" field **717** is set as follows: the attribute "META" **718** is set equal to the value of the local variable *EPE_meta*.

  In addition the range of cells **654** illustrating on the "Editor Space" sheet **655** the current definition of the element profile or meta-element profile is copied onto the memory location pointed by the "*Description Ptr*" field **714**.
  Then the local variable *EPE_desc* is updated with the current profile description, as recorded in the memory location pointed by the "*Description Ptr*" field **714**, and control is given to step **1013**.

- At step **1018**, a test is performed on the value found in the text box **645** to determine if this value corresponds to a valid new name. The corresponding criteria are implementation dependent and may take different forms without departing from the spirit of the invention, as long as the new proposed name is a unique character string against all the already defined names recorded in the

"*Name*" fields **702**, **712**, and **722**. If validity and uniqueness are proven, then control is given to step **1023**; otherwise control is given to step **1024**.

- At step **1019**, the default attributes currently defined in the spreadsheet environment are applied to the "Editor Space" sheet **655**, so that the displayed illustration of the element profile or meta-element profile receives these same default attributes. Then control is given to the step **1013**.

- At step **1020**, the local variable *EPE_size* is either incremented or decremented by 1 (one) according to the direction (up or down) specified by the pointing device **105** on the spin button **647**, and as long as it value remains positive and less than or equal to an upper limit set equal to 254 in a preferred embodiment of the present invention. Then control is given to step **1013**.

- At step **1021**, the local variable *EPE_meta* is updated, so that its value becomes "YES" (respectively "NO") if the bottom (respectively top) option button **650** has been clicked on. Then control is given to step **1013**.

- At step **1022**, the ***Scalable Template Refresh Manager*** command is issued with the following parameters: *EPE_name*, "PROFILE", and *EPE_desc*. Then the local variable *EPE_desc* is updated with the current profile description, as recorded in the memory location pointed by the "*Description Ptr*" field **714** and then control is given to step **1013**.

- At step **1023**, memory space is allocated within the main memory **102** to later record the illustrative range of cells for the element profile or meta-element profile. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file. Then a new record **711** is created in the EPT table **710** which is saved as part of the electronic spreadsheet file, and this new record **711** is initialised as follows:
  - the "*Name*" field **712** is set to the value found in the text box **645** and validated at step **1018**;

- the "*Last Change Date*" field **713** is set to the system time reference, as known by the central processor **101**;
- the "*Description Ptr*" field **714** is set to the memory location which has just been allocated;
- the "*Row #*" field **715** is set to the value 1 (as in the preferred embodiment of the present invention the scalable templates are managed in a 2D environment; this field would carry the number of defined rows for the created profile in a 3D environment);
- the "*Column #*" field **716** is set to the value of the local variable *EPE_size*;
- the "*Type*" field **717** is set as follows: the attribute "META" **718** is set equal to the value of the local variable *EPE_meta*, and the attribute "REFERENCED" **719** is set to "NONE".

  Then control is given to step **1013**.

- At step **1024**, a warning message notification is issued for informing the user that a valid and unique name must be specified in the text box **645** prior to clicking on the "Save As" push-button **651**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **1013**.

- At step **1025**, the Element Profile Editor Dialog Box **641** is closed so that it disappears from the display device **106**, then the "Editor Space" sheet **655** is removed from the window **160** so that it is replaced by the original sheet present at ***Element Profile Editor*** invocation time. Finally control is given back to the initial step **1001** for processing any future ***Element Profile Editor*** command.

E4. Scalable Template Editor method

The method for creating or updating scalable templates used in the preferred embodiment of the present invention is summarised in flowchart **1200** of FIG **12**. This method can be seen as the processing of the ***Scalable Template Editor*** command.

- At step **1201**, the method is in its default state, waiting for an event to initiate the process.

- At step **1202**, the ***Scalable Template Editor*** command is detected, as a result of an user action. This action can be for instance:
  - a specific combination of key on the keyboard **104**, or
  - the click of the pointing device **105** on a specific button, or
  - any other similar means not further specified here.

- At step **1203**, the parameter of the command is retrieved. It corresponds to a mandatory parameter *STE_name* which can either take a reserved value "NEW" or another value corresponding to a character string name, as found in the "*Name*" field **732** of a record **731** within the STMT table **730**. This parameter is recorded as a local variable.

- At step **1204**, some local variables are initialised: the local variable *STE_min* is set to the default value 1 (one), the local variable *STE_max* is set to the default value 255.

- At step **1205**, a test is performed to determine the value taken by the local variable *STE_name*. If found equal to "NEW", then control is given to step **1209**; otherwise control is given to step **1206**.

- At step **1206**, the STT table **720** is looked up to locate a record **721** whose "*Name*" field **722** is found equal to the value taken by the local variable *STE_name*. If such a record is found, then control is given to step **1208**; otherwise control is given to step **1207**.

- At step **1207**, an exception handler is invoked to treat this "should not occur" condition. Such operation is implementation dependent and can take different forms such as the display on the display device **106** of an error message pop-up window. Then control is given to step **1228**.

- At step **1208**,
  - the local variable *STE_min* is set to the value found in the "*Min Element #*" field **725** of the record **721** found at step **1206**,
  - the local variable *STE_max* is set to the value found in the "*Max Element #*" field **726** of the record **721** found at step **1206**.

  Then the memory location pointed by the "*Description Ptr*" field **724** of the record **721** found at step **1206** (where is recorded the description of the scalable template according to the STDT table **760** illustrated in FIG **7E**) is copied in a working buffer which in turns follows the same STDT table **760**.

  This structure is then used to build on the clipboard within the main memory **102** a spreadsheet range of cells illustrating the scalable template definition copied in the working buffer.

  This construction is achieved by loading in the clipboard within the main memory **102** an ordered sequence of ranges of cells, each of them successively abiding by the format (column **765**) and the profile (column **764**) definition corresponding to each pair of format and profile names, starting with the first pair **761** up to the last one **763**.

  Then control is given to step **1210**.

- At step **1209**, a new name for the newly created scalable template is determined, according to a name string taking in a preferred embodiment of the present invention the form "New XX" where XX corresponds to a counter value ensuring the name uniqueness with respect to all the names previously defined and recorded in the "*Name*" fields **702**, **712** and **722** found in the respective records **701**, **711** and **721** of the respective tables EFT **700**, EPT **710** and STT **720**. Any other similar conventional means could be used instead without departing from the spirit of the invention, as long as the uniqueness of the newly created name is ensured. Then the new name is recorded in the local variable *STE_name*.

Then memory space is allocated within the main memory **102** to later record the illustrative range of cells for the new scalable template. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file and follows the STDT table **760** illustrated in FIG **7E**. Then a new record **721** is created in the STT table **720**, and this new record **721** is initialised as follows:

- the "*Name*" field **722** is set to the value of the local variable *STE_name* ;
- the "*Last Change Date*" field **723** is set to the system time reference, as known by the central processor **101** ;
- the "*Description Ptr*" field **724** is set to the memory location which has just been allocated ;
- the "*Min Element #*" field **725** is set to the value of the local variable *STE_min*;
- the "*Max Element #*" field **726** is set to the value of the local variable *STE_max* ; and
- the "*Type*" field **727** is set as follows: the attribute "META" **728** is set equal to "NO", and the attribute "REFERENCED" **729** is set to "NONE".

Then a working buffer is allocated in main memory **102** and initialised with a default scalable template description which corresponds to a single pair **762** of default element format and default element profile. This default scalable template description is then used to build on the clipboard within the main memory **102** a spreadsheet range of cells illustrating the new scalable template. This construction is achieved as explained at the end of the step **1208**. Then control is given to step **1210**.

- At step **1210**, the "Editor Space" sheet **675** is made the current sheet and this sheet is turned to write-protect mode while regular row insertion and deletion are disabled.

Then the top left cell of the range of cells **674** is selected.

Then the local variable *STE_format* is filled with the name of the element format or of the meta-element format corresponding to the row where is located the currently selected cell within the range of cells **674**.

Finally the local variable *STE_profile* is filled with the name of the element profile or of the meta-element profile corresponding to the row where is located the currently selected cell within the range of cells **674**.

- At step **1211,** the Scalable Template Editor Dialog Box **661** is displayed on the display device **106**.
  The label box **664** is initialised with the value of the local variable *STE_name*.
  The text box **666** is filled with the value of the local variable *STE_min*.
  The text box **669** is filled with the value of the local variable *STE_max*.
  The combo box **671** is filled with the value of the local variable *STE_format*.
  The combo box **670** is filled with the value of the local variable *STE_profile*.
  Then the range of cells **674** is updated according to the description recorded in the memory clipboard: the content of the clipboard is pasted on this blank sheet at a fixed cell address **674** (address B2 in a preferred embodiment of the present invention, as shown on FIG **6D**), so that the user can visualise on the display device **106**, within the window **660** an illustration of the scalable template.
  Then a test is performed to check if all the element formats, element profiles, meta-element formats and meta-elements profiles contributing to the scalable template definition illustrated by the range of cells **674**, have the same number of fields. If it is the case, then the two push-buttons "*Save*" **673** and "*Save As*" **672** are enabled, so that the click with the pointing device **105** on one of these two push-buttons is recognised as a valid event. Otherwise the two push-buttons "*Save*" **673** and "*Save As*" **672** are disabled, so that the click with the pointing device **105** on one of these two push-buttons is not recognised as a valid event.

- At step **1212,** the method is waiting for any user action on the Scalable Template Editor Dialog Box **661**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1213**, a user action on the Scalable Template Editor Dialog Box **661** is detected.

- If the user action is a click on the push-button "Save" **673**, then control is given to step **1216**;
- if the user action is a click on the push-button "Save As" **672**, then control is given to step **1219**;
- if the user action is a click on the push-button "Add" **677**, then control is given to step **1224**;
- if the user action is a click on the push-button "Delete" **678**, then control is given to step **1225**;
- if the user action is a click on the push-button "Up" **679** or on the push-button "Down" **680**, then control is given to step **1226**;
- if the user action is an update of the combo box **671**, then control is given to step **1214**;
- if the user action is an update of the combo box **670**, then control is given to step **1215**;
- if the user action is a click on the spin button **667**, then control is given to step **1222**;
- if the user action is a click on the spin button **668**, then control is given to step **1223**;
- if the user action is a click on the push-button "Done" **663**, or on the closing-window push-button **662**, then control is given to step **1228**.

- At step **1214**, the scalable template description is updated in the working buffer by replacing by the element format or meta-element format name found in the text box **671** the previous element format or meta-element format specification corresponding to the element or meta-element illustrated by the currently selected cell within the range of cells **674**. Then the local variable *STE_format* is also set equal to the name found in the text box **671**. Then control is given to step **1211**.

- At step **1215**, the scalable template description is updated in the working buffer by replacing by the element profile or meta-element profile name found in the text box **670** the previous element profile or meta-element profile specification corresponding to the element or meta-element illustrated by the currently

selected cell within the range of cells **674**. Then the local variable *STE_profile* is also set equal to the name found in the text box **670**. Then control is given to step **1211**.

- At step **1216**, a test is performed to check if the currently edited scalable template is already referenced by an existing scalable template instance. For this purpose is considered the value of the "REFERENCED" attribute **729** within the "*Type*" field **727** of the record **721** within the STT table **720** whose "*Name*" field **722** is equal to the local variable *STE_name.* If the value of this attribute is found equal to "NONE", then control is given to step **1217**; otherwise control is given to step **1218**.

- At step **1217**, the STT table **720** is updated by refreshing the record **721** whose "*Name*" field **722** is equal to the local variable *STE_name.* For this purpose,
  - the "*Last Change Date*" field **723** is set to the system time reference, as known by the central processor **101** ;
  - the "*Min Element #*" field **725** is set to the value of the local variable *STE_min;*
  - the "*Max Element #*" field **726** is set to the value of the local variable *STE_max.*

  In addition the current description of the scalable template, as illustrated by the range of cells **674**, as recorded in the working buffer, and following the STDT table **760** is copied onto the memory location pointed by the "*Description Ptr*" field **724**. For each element format name or meta-element format name found in the column **765** of this STDT table **760**, the EFT table **700** is visited to identify the corresponding record **701** whose "*Name*" field **702** matches this element or meta-element format name. Once found, the "REFERENCED" attribute **709** of the "*Type*" field **707** of this record **701** is set to the value TEMPLATE if and only if its former value was equal to NONE. For each element profile name or meta-element profile name found in the column **764** of this STDT table **760**, the EPT table **710** is visited to identify the corresponding record **711** whose "*Name*" field **712** matches this element or meta-element profile name. Once found, the

"REFERENCED" attribute **719** of the "*Type*" field **717** of this record **711** is set to the value TEMPLATE if and only if its former value was equal to NONE. Then control is given to step **1211**.

- At step **1218**, a warning message notification is issued for informing the user that the edited scalable template is already referenced by an existing scalable template instance. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Then the user is prompted to either cancel the current "Save" operation, or to pursue it. This can typically be done by displaying on the display device **106** a prompting message in a pop-up window, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has made his choice through conventional means such as clicking with the pointing device **105** on an "Cancel" or "Continue" push-button present within a prompting message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **1211** if the spreadsheet user decision is to cancel the operation, or to step **1217** if the spreadsheet user decision is to continue the operation.

- At step **1219**, a test is performed on the value found in the text box **665** to determine if it corresponds to a valid new name. The corresponding criteria are implementation dependent and may take different forms without departing from the spirit of the invention, as long as the new proposed name is a unique character string against all the already defined names recorded in the "*Name*" fields **702**, **712**, and **722**. If validity and uniqueness are proven, then control is given to step **1220**; otherwise control is given to step **1221**.

- At step **1220**, memory space is allocated within the main memory **102** to later record the descriptor of the scalable template. This allocated memory is part of the memory space corresponding to the currently opened electronic spreadsheet file. Then a new record **721** is created in the STT table **720**, and this new record **721** is initialised as follows:

- the "*Name*" field **722** is set to the value found in the text box **665** and validated at step **1219**;
- the "*Last Change Date*" field **723** is set to the system time reference, as known by the central processor **101** ;
- the "*Description Ptr*" field **724** is set to the memory location which has just been allocated ;
- the "*Min Element #*" field **725** is set to the value of the local variable *STE_min*;
- the "*Max Element #*" field **726** is set to the value of the local variable *STE_max* ; and
- the "*Type*" field **727** is set as follows: the attribute "META" **728** is set equal to "NO", and the attribute "REFERENCED" **719** is set to "NONE".

In addition the current description of the scalable template, as illustrated by the range of cells **674**, as recorded in the working buffer, and following the STDT table **760** is copied onto the memory location pointed by the "*Description Ptr*" field **724**. For each element format name or meta-element format name found in the column **765** of this STDT table **760**, the EFT table **700** is visited to identify the corresponding record **701** whose "*Name*" field **702** matches this element or meta-element format name. Once found, the "REFERENCED" attribute **709** of the "*Type*" field **707** of this record **701** is set to the value TEMPLATE if and only if its former value was equal to NONE. For each element profile name or meta-element profile name found in the column **764** of this STDT table **760**, the EPT table **710** is visited to identify the corresponding record **711** whose "*Name*" field **712** matches this element or meta-element profile name. Once found, the "REFERENCED" attribute **719** of the "*Type*" field **717** of this record **711** is set to the value TEMPLATE if and only if its former value was equal to NONE. Then control is given to step **1211**.

- At step **1221**, a warning message notification is issued for informing the user that a valid and unique name must be specified in the text box **665** prior to clicking on the "Save As" push-button **672**. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from

the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **1211**.

- At step **1222**, the local variable *STE_min* is either incremented or decremented by 1 (one) according to the direction (up or down) specified by the pointing device **105** on the spin button **667**, and as long as its value remains positive and less than or equal to both an upper limit set equal to 254 in a preferred embodiment of the present invention and to the value shown in the text box **669**. Then control is given to step **1211**.

- At step **1223**, the local variable *STE_max* is either incremented or decremented by 1 (one) according to the direction (up or down) specified by the pointing device **105** on the spin button **668**, and as long as its value remains positive, greater than the value shown in the text box **666** and less than or equal to an upper limit set equal to 254 in a preferred embodiment of the present invention. Then control is given to step **1211**.

- At step **1224**, a new row is inserted in the range of cells **674** illustrating the edited scalable template, above the row where the last selected cell was previously located.

  Then the left most cell located on the new row within the range of cells **674** is selected.

  Then the scalable template definition is updated in the working buffer by introducing a new meta-element which is described, like the other ones, by a couple (meta-element format **765**, meta-element profile **764**) which defaults to a couple of default format and default profile, which are also respectively assigned to the local variable *STE_format* and *STE_profile*.

  In addition the current description of the scalable template, as illustrated by the range of cells **674**, as recorded in the working buffer, and following the STDT

table **760** is copied onto the memory location pointed by the "*Description Ptr*" field **724**.

Then control is given to step **1211**.

- At step **1225**, the row containing the selected cell is removed from the range of cells **674**.

  Then the left most cell located within the range of cells **674** on the row representing the element defined within the edited scalable template is selected.

  Then the scalable template definition is updated by removing the deleted meta-element which was described by a couple (meta-element format, meta-element profile).

  In addition the current description of the scalable template, as illustrated by the range of cells **674**, as recorded in the working buffer, and following the STDT table **760** is copied onto the memory location pointed by the "*Description Ptr*" field **724**.

  Then control is given to step **1227**.

- At step **1226**, the current cell within the "Editor Space" sheet **675** is respectively moved up or down if the spreadsheet user has clicked with the pointing device **105** on the "Up" push-button **679**, or on the "Down" push-button **680**, and also if this movement does not move the current cell away from the range of cells **674** illustrating the scalable template.

- At step **1227**, the local variables *STE_format* and *STE_profile* are respectively set equal to the name of the element format or meta-element format and to the name of the element profile or meta-element profile corresponding to either the element or the meta-element illustrated by to the currently selected cell within the range of cells **674**. Then control is given to step **1211**.

- At step **1228**, the Scalable Template Editor Dialog Box **661** is closed so that it disappears from the display device **106**, then the "Editor Space" sheet **675** is removed from the window **160** so that it is replaced by the original sheet present at ***Element Profile Editor*** invocation time. All the means which were temporarily

disabled while the "Editor Space" sheet **675** was displayed are now enabled again. Finally control is given back to the initial step **1201** for processing any future ***Scalable Template Editor*** command.

E5. Scalable Template Instanciator method

The method for creating a scalable template instance abiding by a defined scalable template used in the preferred embodiment of the present invention is summarised in flowchart **1400** of FIG **14**. This method can be seen as the processing of the ***Scalable Template Instanciator*** command.

- At step **1401**, the method is in its default state, waiting for an event to initiate the process.

- At step **1402**, the ***Scalable Template Instanciator*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

- At step **1403**, the command parameter *ST_name* is first retrieved: it corresponds to the name of the scalable template that the scalable template instance to be created will abide by. This parameter *ST_name* is used to parse the STT table **720** in order to find the record **721** whose "*Name*" field **722** matches the parameter *ST_name*. Once this record **721** is found, its fields "*Min Element #*" **725** and "*Max Element #*" **726** are respectively memorized as local variables *STI_min* and *STI_max*. Then its field "*Description Ptr*" **724** is used to determine, according to the referenced STDT table **760**, the number of meta-elements defined within the scalable template, and the number of cells defined within each element or meta-element member of the scalable template. The first number is memorized in a local variable *STI_meta*, and the second number is memorized in a local variable *STI_width* **1325** (representing the number of columns of the future scalable template instance).
  Then another local variable *STI_element* is initialised with the value taken by *STI_min*.

Then another local variable *STI_critical* is initialised with the default value "YES".
Then another local variable *STI_sheet_width* **1321** is initialised with the total number of columns in the current sheet **1320**.
Then another local variable *STI_sheet_height* **1322** is initialised with the total number of rows in the current sheet **1320**.
Then another local variable *STI_mode* is initialised with the value OVERLAY.

- At step **1404**, some other local variables are first built or updated. The position of the currently selected cell **1327** is first represented by the local variables *STI_offset_width* **1323** and *STI_offset_height* **1324** corresponding respectively to the number of columns and of rows between the top left cell of the current sheet **1320** and the currently selected cell **1327**.
Then the number of rows of the future scalable template instance is represented by the local variable *STI_height* **1326**, computed as the sum of the local variables *STI_meta* and *STI_element*.
Second some working ranges of cells are determined through the evaluation of their addresses.
The range of cells *STI_range* **1328** corresponding to the future scalable template instance is first determined as the range of cells with the currently selected cell **1327** as the top left cell, and with a number of rows and columns respectively equal to *STI_height* **1326** and *STI_width* **1325**.
Then the range of cells *STI_horizontal_flushed_range* **1330** is determined as the range of cells sharing the same rows as *STI_range* **1328**, and occupying the *STI_width* **1325** rightmost columns of the current sheet **1320**.
Then the range of cells *STI_horizontal_kept_range* **1329** is determined as the range of cells sharing the same rows as *STI_range* **1328**, and occupying the columns located between those of *STI_range* **1328** and *STI_horizontal_flushed_range* **1330**.
Then the range of cells *STI_vertical_flushed_range* **1332** is determined as the range of cells sharing the same columns as *STI_range* **1328**, and occupying the *STI_height* **1326** bottom columns of the current sheet **1320**.

Then the range of cells *STI_vertical_kept_range* **1331** is determined as the range of cells sharing the same columns as *STI_range* **1328**, and occupying the rows located between those of *STI_range* **1328** and *STI_vertical_flushed_range* **1332**.

- At step **1405**, two sums are performed to check if the future scalable template instance will fit within the boundaries of the current sheet **1320**.
  - If the sum of the local variables *STI_offset_width* **1323** and *STI_width* **1325** is found greater than the local variable *STI_sheet_width* **1321**, then a local variable *STI_too_wide* is set to "YES"; otherwise it is set to "NO".
  - If the sum of the local variables *STI_offset_height* **1324** and *STI_height* **1326** is found greater than the local variable *STI_sheet_height* **1322**, then a local variable *STI_too_high* is set to "YES"; otherwise it is set to "NO".

- At step **1406**, several tests are performed to evaluate the potential impact of the creation of the future scalable template instance, according to the five possible instanciation modes, on any already existing scalable template instance or data. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

First the OVERLAY mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells *STI_range* **1328**, then the local test variable *STI_overlay_critical* takes the

value "YES"; otherwise the local test variable *STI_overlay_critical* takes the value "NO".

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells *STI_range* **1328**, then the local test variable *STI_overlay_other* takes the value "YES"; otherwise the local test variable *STI_overlay_other* takes the value "NO".
- If all the cells within the range of cells *STI_range* **1328** are empty (containing none data), then the local test variable *STI_overlay_data* takes the value "NO"; otherwise the local test variable *STI_overlay_data* takes the value "YES".

Second the HORIZONTAL_INSERT mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1327**, or which partially overlaps the range of cells constituted by the last bottom *STI_height* **1326** rows, or which is included in the range of cells constituted by the last bottom *STI_height* **1326** rows, then the local test variable *STI_horizontal_critical* takes the value "YES"; otherwise the local test variable *STI_horizontal_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1327**, or which partially overlaps the range of cells constituted by the last bottom *STI_height* **1326** rows, or which is included in the range of cells constituted by the last bottom *STI_height* **1326** rows, then the local test variable *STI_horizontal_other* takes the value "YES"; otherwise the local test variable *STI_horizontal_other* takes the value "NO".
- If all the cells within the range of cells constituted by the last bottom *STI_height* **1326** rows are empty (containing none data), then the local test variable *STI_horizontal_data* takes the value "NO"; otherwise the local test variable *STI_horizontal_data* takes the value "YES".

Third the HORIZONTAL_INSERT_BY_RANGE mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STI_range* **1328** and *STI_vertical_kept_range* **1331**, or which partially overlaps the range of cells *STI_vertical_flushed_range* **1332**, or which is included in the range of cells *STI_vertical_flushed_range* **1332**, then the local test variable *STI_horizontal_range_critical* takes the value "YES"; otherwise the local test variable *STI_horizontal_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STI_range* **1328** and *STI_vertical_kept_range* **1331**, or which partially overlaps the range of cells *STI_vertical_flushed_range* **1332**, or which is included in the range of cells *STI_vertical_flushed_range* **1332**, then the local test variable *STI_horizontal_range_other* takes the value "YES"; otherwise the local test variable *STI_horizontal_range_other* takes the value "NO".
- If all the cells within the range of cells *STI_vertical_flushed_range* **1332** are empty (containing none data), then the local test variable *STI_horizontal_range_data* takes the value "NO"; otherwise the local test variable *STI_horizontal_range_data* takes the value "YES".

Fourth the VERTICAL_INSERT mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire column where is located the currently selected cell **1327**, or which partially overlaps the range of cells constituted by the last right *STI_width* **1325** columns, or which is included in the range of cells constituted by the last right *STI_width* **1325** columns, then the local test variable *STI_vertical_critical* takes the value "YES"; otherwise the local test variable *STI_vertical_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire column where is located the currently selected cell **1327**, or

which partially overlaps the range of cells constituted by the last right *STI_width* **1325** columns, or which is included in the range of cells constituted by the last right *STI_width* **1325** columns, then the local test variable *STI_vertical_other* takes the value "YES"; otherwise the local test variable *STI_vertical_other* takes the value "NO".

- If all the cells within the range of cells constituted by the last right *STI_width* **1325** columns are empty (containing no data), then the local test variable *STI_vertical_data* takes the value "NO"; otherwise the local test variable *STI_vertical_data* takes the value "YES".

Fifth the VERTICAL_INSERT_BY_RANGE mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STI_range* **1328** and *STI_horizontal_kept_range* **1329**, or which partially overlaps the range of cells *STI_horizontal_flushed_range* **1330**, or which is included in the range of cells *STI_horizontal_flushed_range* **1330**, then the local test variable *STI_vertical_range_critical* takes the value "YES"; otherwise the local test variable *STI_vertical_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STI_range* **1328** and *STI_horizontal_kept_range* **1329**, or which partially overlaps the range of cells *STI_horizontal_flushed_range* **1330**, or which is included in the range of cells *STI_horizontal_flushed_range* **1330**, then the local test variable *STI_vertical_range_other* takes the value "YES"; otherwise the local test variable *STI_vertical_range_other* takes the value "NO".
- If all the cells within the range of cells *STI_horizontal_flushed_range* **1330** are empty (containing none data), then the local test variable *STI_vertical_range_data* takes the value "NO"; otherwise the local test variable *STI_vertical_range_data* takes the value "YES".

- At step **1407**, the Scalable Template Instanciator Dialog Box **1300** is displayed on the display device **106**. The "*Critical*" check box **1314** displays a check mark if the local variable *STI_critical* takes the value "YES"; otherwise (value "NO"), the "*Critical*" check box **1314** is kept with a blank empty display. The label box **1315** is initialised with the value of the local variable *ST_name*. The text box **1312** is filled with the value of the local variable *STI_element*. The label box **1311** is filled with the value of the local variable *STI_too_wide* and the label box **1310** is filled with the value of the local variable *STI_too_high*. The 15 label boxes **1304** are filled row after row, starting with the top row, from the left to the right, with the values of the following local variables in the following order: *STI_overlay_critical*, *STI_overlay_other*, *STI_overlay_data*, *STI_horizontal_critical*, *STI_horizontal_other*, *STI_horizontal_data*, *STI_horizontal_range_critical*, *STI_horizontal_range_other*, *STI_horizontal_range_data*, *STI_vertical_critical*, *STI_vertical_other*, *STI_vertical_data*, *STI_vertical_range_critical*, *STI_vertical_range_other*, *STI_vertical_range_data*.
Then if the local variable *STI_mode* takes the respective value OVERLAY, or HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, or VERTICAL_INSERT, or VERTICAL_INSERT_BY_RANGE, then the option button "*Overlay*" **1309**, or "*Horizontal Insert*" **1308**, or "*Horizontal Insert by Range*" **1307**, or "*Vertical Insert*" **1306**, or "*Vertical Insert by Range*" **1305** displays alone a black point. Finally the "*Create*" push-button **1303** is disabled as soon as one of the following local variables takes the value "YES": *STI_too_wide*, *STI_too_high*, *STI_overlay_critical* (only taken into account if the local variable *STI_mode* is equal to OVERLAY) , *STI_horizontal_critical* (only taken into account if the local variable *STI_mode* is equal to HORIZONTAL_INSERT), *STI_vertical_critical* (only taken into account if the local variable *STI_mode* is equal to VERTICAL_INSERT), *STI_horizontal_range_critical* (only taken into account if the local variable *STI_mode* is equal to HORIZONTAL_INSERT_BY_RANGE), *STI_vertical_range_critical* (only taken into account if the local variable *STI_mode* is equal to VERTICAL_INSERT_BY_RANGE); otherwise the "*Create*" push-button **1303** is enabled.

- At step **1408**, the method is waiting for any user action on the Scalable Template Instanciator Dialog Box **1300**, or on any change of the currently selected cell.

Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1409**, a user action on the Scalable Template Instanciator Dialog Box **1300**, or a change of the currently selected cell is detected.
  - If the user action is a click on the "*Create*" push-button **1303**, then control is given to step **1414**;
  - if the user action is a click on the upper part of the spin button **1313**, then control is given to step **1413**;
  - if the user action is a click on the lower part of the spin button **1313**, then control is given to step **1412**;
  - if the user action is a click on the "*Critical*" check box **1314**, then control is given to step **1411**;
  - if the user action is a click on one of the option buttons **1309**, or **1308**, or **1307**, or **1306**, or **1305**, then control is given to step **1410**;
  - if the user action is a click on the "*Cancel*" push-button **1302**, or on the closing-window push-button **1301**, then control is given to step **1429**;
  - finally if the user action is a change in the position of the currently selected cell, then control is given to step **1404**.

- At step **1410**, the local variable *STI_mode* takes the value OVERLAY, or HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, or VERTICAL_INSERT, or VERTICAL_INSERT_BY_RANGE if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **1309**, or **1308**, or **1307**, or **1306**, or **1305**. Then control is given to step **1404**.

- At step **1411**, the local variable *STI_critical* is updated in order to swap between the values "YES" and "NO". Then control is given to step **1404**.

- At step **1412**, the local variable *STI_element* is decremented by 1 (one), as long as its value remains greater than or equal to the value of the local variable *STI_min*. Then control is given to step **1404**.

- At step **1413**, the local variable *STI_element* is incremented by 1 (one), as long as its value remains less than or equal to the value of the local variable *STI_max*. Then control is given to step **1404**.

- At step **1414**, the STIT table **750** is visited to remove from it every record **751** corresponding to a scalable template instance corrupted by the introduction of the new instance, as identified during the step **1406** for the insertion mode represented by the local variable *STI_mode*.
  Then the EFT, EPT and STT tables **700**, **710** and **720** must be potentially updated to reflect any possible change in the way formats, or profiles, or scalable templates are referenced, resulting from the removal of scalable template instances. This process, described hereafter, will be referred to as the "Reference Housekeeping Process".
  For each such removed scalable template instance, the associated record **751** within the STIT table **750** contains a "*ST*" field **753** which identifies the associated scalable template. If there is not other remaining record **751** in the STIT table **750** sharing the same value of the "*ST*" field **753** as the one of the removed record **751**, and whose "*Address*" field **752** differs from the value "CLIPBOARD", then it means that the removed scalable template instance was the last one abiding by its associated scalable template. In this case, this "*ST*" field **753** is used to scan the STT table **720** for identifying a record **721** whose "*Name*" field **722** is equal to the "*ST*" field **753**, and then to set within this found record **721** the "REFERENCED" attribute **729** of the "*Type*" field **727** to the value NONE. Then in this same case, the scalable template STDT table **760** pointed by the "*Description Ptr*" field **724** within this found record **721** of the STT table **720** must be scanned to determine if the removed scalable template instance was the last one referencing any of the associated format or profile. For each name found in this STDT table **760** (referred to as *STI_removed_name* either for a format name as found in the column **765**, or for a profile name as found in the column **764**), the STIT table **750** is scanned to identify any other record **751** whose "*Address*" field **752** differs from the value "CLIPBOARD" and whose "*ST*" field **753** specifies another scalable template name whose associated record **721** in the STT table

720 (with "*Name*" field **722** matching this "*ST*" field **753**) comprises a "*Description Ptr*" field **724** pointing to another STDT table **760** where the same name *STI_removed_name* is specified. If no other record **751** matching this criteria is found in the STIT table **750**, then it means that this object (either a format or a profile) is no longer referenced in an existing scalable template instance. If this object is a format name, then the EFT table **700** is scanned to first identify the record **701** whose "*Name*" field **702** matches this format name *STI_removed_name*, and then when found the "REFERENCED" attribute **709** of the "*Type*" field **707** within this found record **701** is set to the value TEMPLATE. If this object is a profile name, then the EPT table **710** is scanned to first identify the record **711** whose "*Name*" field **712** matches this profile name *STI_removed_name*, and then when found the "REFERENCED" attribute **719** of the "*Type*" field **717** within this found record **711** is set to the value TEMPLATE. Then for each name *STI_removed_name*, the STT table **720** is scanned to identify a record **721** whose "*Description Ptr*" field **724** points to a STDT table **760** containing this name *STI_removed_name*. If no record **721** matching this criteria is found in the STT table **720**, then it means that this object (either a format or a profile) is no longer referenced in an existing scalable template. If this object is a format name, then the EFT table **700** is scanned to first identify the record **701** whose "*Name*" field **702** matches this format name *STI_removed_name*, and then when found the "REFERENCED" attribute **709** of the "*Type*" field **707** within this found record **701** is set to the value NONE. If this object is a profile name, then the EPT table **710** is scanned to first identify the record **711** whose "*Name*" field **712** matches this profile name *STI_removed_name*, and then when found the "REFERENCED" attribute **719** of the "*Type*" field **717** within this found record **711** is set to the value NONE. All these operations are repeated for each removed scalable template instance and constitute the "Reference Housekeeping Process".

- At step **1415**, a new record **751** is introduced in the STIT table **750**. Within this record **751**, the "*Address*" field **752** is initialised with the address of the range of cells *STI_range* **1328**, the "*ST*" field **753** is initialised with the value of the local

variable *ST_name*, the "*Element #*" field **754** is initialised with the value of the local variable *STI_element*, the "*Critical*" field **755** is initialised with the value of the local variable *STI_critical*, the "*Header Size*" field **756** is initialised with the number of meta-elements constituting the header part of the new scalable template instance (this number being equal to the number of pairs in the header part **767** of the STDT table **760** associated to the scalable template that the new scalable template instance will abide by), and the "*Footer Size*" field **757** is initialised with the number of meta-elements constituting the footer part of the new scalable template instance (this number being equal to the number of pairs in the footer part **766** of the STDT table **760** associated to the scalable template abided by the new scalable template instance). Then the STT table **720** is scanned to identify the record **721** whose "*Name*" field is found equal to the local variable *ST_name*. Once found, the "REFERENCED" attribute **729** within the "*Type*" field **727** of this record **721** is set to the value INSTANCE.

- At step **1416** a test is performed to check the value of the local variable *STI_mode*.
  - If this value is found equal to OVERLAY then control is given to step **1421**,
  - If this value is found equal to HORIZONTAL_INSERT then control is given to step **1420**,
  - If this value is found equal to HORIZONTAL_INSERT_BY_RANGE then control is given to step **1418**,
  - If this value is found equal to VERTICAL_INSERT then control is given to step **1419**,
  - If this value is found equal to VERTICAL_INSERT_BY_RANGE then control is given to step **1417**.

- At step **1417**, the range of cells *STI_range* **1328** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1327** and then a regular operation of "column insertion within selected range" is performed. Then control is given to step **1421**.

- At step **1418**, the range of cells *STI_range* **1328** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1327** and then a regular operation of "row insertion within selected range" is performed. Then control is given to step **1421**.

- At step **1419**, the range of cells *STI_range* **1328** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1327** and then a regular operation of "column insertion" is performed. Then control is given to step **1421**.

- At step **1420**, the range of cells *STI_range* **1328** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1327** and then a regular operation of "row insertion" is performed. Then control is given to step **1421**.

- At step **1421**, a local variable *STI_index* is initialised to the value taken by the local variable *STI_element*. Then the STT table **720** is parsed to identify the record **721** whose "*Name*" field **722** matches the value of the local variable *ST_name*. Within this record **721** is retrieved the "*Description Ptr*" field **724** allowing to locate in memory the STDT table **760** associated to the scalable template that the new scalable template instance to be created will abide by. Then the first pair **761** of element or meta-element format name and element or meta-element profile name found within this STDT table **760** is set as the current pair of names: (format name, profile name). Then the EFT table **700** is visited to identify the corresponding record **701** whose "*Name*" field **702** matches this element or meta-element format name. Once found, the "REFERENCED" attribute **709** of the "*Type*" field **707** of this record **701** is set to the value INSTANCE. Then the EPT table **710** is visited to identify the corresponding record **711** whose "*Name*" field **712** matches this element or meta-element profile name. Once found, the "REFERENCED" attribute **719** of the "*Type*" field **717** of this record **711** is set to the value INSTANCE.

- At step **1422**, the EPT table **710** is parsed to find the record **711** whose "*Name*" field **712** is found equal to the profile name within the current pair. Once this record **711** is found, its "*Description Ptr*" field **714** is retrieved to locate in memory the range of cells illustrating the profile. This description of the profile is copy-pasted by value only onto the currently selected cell, so that the corresponding row within the *STI_range* receives the profile initial values. Then the EFT table **700** is parsed to find the record **701** whose "*Name*" field **702** is found equal to the format name within the current pair. Once this record **701** is found, its "*Description Ptr*" field **704** is retrieved to locate in memory the range of cells illustrating the format. This description of the profile is copy-pasted by attribute only onto the currently selected cell, so that the corresponding row within the *STI_range* receives the format attributes.

- At step **1423** a test is performed to check if the current pair (format name, profile name) corresponds to an element or to a meta-element. In the first case, control is given to step **1424**, and in the second case control is given to step **1425**.

- At step **1424**, the local variable *STI_index* is decremented by 1 (one). Then control is given to step **1426**.

- At step **1425**, a test is performed to check if the current pair (format name, profile name) is the last one **763** within the STDT table **760**. If it is the case, the control is given to step **1429**, otherwise control is given to step **1427**.

- At step **1426**, a test is performed to check if the local variable *STI_index* is equal to 0 (zero). If it is the case, then control is given to step **1425**, otherwise control is given to step **1428**.

- At step **1427**, the pair of names (format name, profile name) following the current one in the STDT table **760** becomes the current pair of names. Then the EFT table **700** is visited to identify the corresponding record **701** whose "*Name*" field **702** matches this element or meta-element format name. Once found, the "REFERENCED" attribute **709** of the "*Type*" field **707** of this record **701** is set to the

value INSTANCE. Then the EPT table **710** is visited to identify the corresponding record **711** whose "*Name*" field **712** matches this element or meta-element profile name. Once found, the "REFERENCED" attribute **719** of the "*Type*" field **717** of this record **711** is set to the value INSTANCE.

- At step **1428**, the currently selected cell is moved downwards by one row. Then control is given to step **1422**.

- At step **1429**, the Scalable Template Instanciator Dialog Box **1300** is closed so that it disappears from the display device **106**. Finally control is given back to the initial step **1401** for processing any future ***Scalable Template Instanciator*** command.

E6. Scalable Template Instance Insertion Manager method

The method for changing an existing scalable template instance by introducing new elements used in the preferred embodiment of the present invention is summarised in flowchart **1500** of FIG **15**. This method can be seen as the processing of the ***Scalable Template Instance Insertion Manager*** command.

- At step **1501**, the method is in its default state, waiting for an event to initiate the process.

- At step **1502**, the ***Scalable Template Instance Insertion Manager*** command is detected, as a result of a user action. This action can be for instance:
  - a specific combination of key on the keyboard **104**, or
  - the click of the pointing device **105** on a specific button or menu entry or sub-menu entry, or
  - any other similar means not further specified here.

  When the ***Scalable Template Instance Insertion Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of

cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **1503**, a test is performed to check if the currently selected cell is located within an existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell **1707**. If it is the case, then the currently selected cell **1707** is contained in a scalable template instance named *STIM_instance_range* **1713** and control is given to step **1504** ; otherwise control is given to step **1513**.

- At step **1504**, the record **751** found at the step **1503** is first retrieved to initialise local variables from its fields describing the scalable template instance *STIM_instance_range* **1713**:
  - the local variable *ST_name* is initialised with the value of the field "*ST*" **753**;
  - the local variable *STIM_element* is initialised with the value of the "*Element #*" field **754**;
  - the local variable *STIM_critical* is initialised with the value of the "*Critical*" field **755**;
  - the local variable *STIM_header_size* is initialised with the value of the "*Header Size*" field **756**;
  - the local variable *STIM_footer_size* is initialised with the value of the "*Footer Size*" field **757**;

Then the local variable *ST_name* is used to parse the STT table **720** in order to find the record **721** whose "*Name*" field **722** matches the parameter *ST_name*. Once this record **721** is found, its field "*Max Element #*" **726** is memorized as the local variable *STIM_max*. Then another local variable *STIM_sheet_width* **1701** is initialised with the total number of columns in the current sheet **1700**. Then another local variable *STIM_sheet_height* **1702** is initialised with the total number of rows in the current sheet **1700**. Then another local variable *STIM_mode* is initialised with the value HORIZONTAL_INSERT. Then the position of

the currently selected cell **1707** is used to initialise the local variable *STIM_range_offset_height* **1709** corresponding to the number of rows between the top left cell of the current sheet **1700** and the currently selected cell **1707**. Then the number of rows of the currently selected range of cells *STIM_range* **1708** is represented by the local variable *STIM_height* **1706**. Then the position of the top left cell of the range of cells *STIM_instance_range* **1713** is first represented by the local variables *STIM_offset_width* **1703** and *STIM_offset_height* **1704** corresponding respectively to the number of columns and of rows between the top left cell of the current sheet **1320** and the top left cell of the range of cells *STIM_instance_range* **1713**. Then the range of cells *STIM_vertical_flushed_range* **1712** is determined as the range of cells sharing the same columns as *STIM_instance_range* **1713**, and occupying the *STIM_height* **1706** bottom columns of the current sheet **1700**. Then the range of cells *STIM_vertical_kept_range* **1711** is determined as the range of cells sharing the same columns as *STIM_instance_range* **1713**, and occupying the rows located between those of *STIM_instance_range* **1713** and *STIM_vertical_flushed_range* **1712**.

- At step **1505**, a test is performed to test if the currently selected cell **1707** is located either within the header part or the footer part of the current scalable template instance, or within an element of the current scalable template instance. If the sum of the local variables *STIM_offset_height* **1704** and *STIM_header_size* is less than or equal to the local variable *STIM_range_offset_height* **1709** and if the local variable *STIM_range_offset_height* **1709** is less than or equal to the sum of the local variables *STIM_offset_height* **1704**, *STIM_header_size*, and *STIM_element*, then the currently selected cell **1707** is outside the header and footer parts of the current scalable template instance and control is given to step **1508**; otherwise control is given to step **1506**.

- At step **1506**, a warning message notification is issued for informing the user that the current scalable template instance may be corrupted if the insertion operation is pursued. This can typically be done by displaying on the display device **106** a

warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Then the user is prompted to either cancel the current "Insertion" operation, or to pursue it. This can typically be done by displaying on the display device **106** a prompting message in a pop-up window, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has made his choice through conventional means such as clicking with the pointing device **105** on an "Cancel" or "Continue" push-button present within a prompting message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **1501** if the spreadsheet user decision is to cancel the operation, or to step **1507** if the spreadsheet user decision is to continue the operation.

- At step **1507**, the STIT table **750** is visited to remove from it the record **751** corresponding to the current scalable template instance identified at step **1503** and containing the currently selected cell **1707**. Then the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is executed, before giving control to step **1508**.

- At step **1508**, two sums are performed to check if the insertion within the current scalable template instance will fit within the boundaries of the current sheet **1700** and within the maximum size of the scalable template instance.
  - If the sum of the local variables *STIM_height* **1706** and *STIM_element* is found greater than the local variable *STIM_max*, then a local variable *STIM_too_high* is set to "YES"; otherwise it is set to "NO".
  - If the sum of the local variables *STIM_offset_height* **1704** and *STIM_header_size* and *STIM_element* and *STIM_footer_size* and *STIM_height* **1706** is found greater than the local variable *STIM_sheet_height* **1702**, then a local variable *STIM_too_high* is set to "YES"; otherwise it is set to "NO".

- At step **1509**, several tests are performed to evaluate the potential impact of the insertion, according to two possible insertion modes, on any already existing

scalable template instance or data. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

First the HORIZONTAL_INSERT mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1707**, or which partially overlaps the range of cells constituted by the last bottom *STIM_height* **1706** rows, or which is included in the range of cells constituted by the last bottom *STIM_height* **1706** rows, then the local test variable *STIM_horizontal_critical* takes the value "YES"; otherwise the local test variable *STIM_horizontal_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1707**, or which partially overlaps the range of cells constituted by the last bottom *STIM_height* **1706** rows, or which is included in the range of cells constituted by the last bottom *STIM_height* **1706** rows, then the local test variable *STIM_horizontal_other* takes the value "YES"; otherwise the local test variable *STIM_horizontal_other* takes the value "NO".
- If all the cells within the range of cells constituted by the last bottom *STIM_height* **1706** rows are empty (containing none data), then the local test variable *STIM_horizontal_data* takes the value "NO"; otherwise the local test

variable *STIM_horizontal_data* takes the value "YES".

Second the HORIZONTAL_INSERT_BY_RANGE mode of instanciation is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the range of cells *STIM_vertical_kept_range* **1711** with the range of cells which is derived from the range of cells *STIM_instance_range* **1713** by removing the rows above the currently selected cell **1707**, or which partially overlaps the range of cells *STIM_vertical_flushed_range* **1712**, or which is included in the range of cells *STIM_vertical_flushed_range* **1712**, then the local test variable *STIM_horizontal_range_critical* takes the value "YES"; otherwise the local test variable *STIM_horizontal_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the range of cells *STIM_vertical_kept_range* **1711** with the range of cells which is derived from the range of cells *STIM_instance_range* **1713** by removing the rows above the currently selected cell **1707**, or which partially overlaps the range of cells *STIM_vertical_flushed_range* **1712**, or which is included in the range of cells *STIM_vertical_flushed_range* **1712**, then the local test variable *STIM_horizontal_range_other* takes the value "YES"; otherwise the local test variable *STIM_horizontal_range_other* takes the value "NO".
- If all the cells within the range of cells *STIM_vertical_flushed_range* **1712** are empty (containing none data), then the local test variable *STIM_horizontal_range_data* takes the value "NO"; otherwise the local test variable *STIM_horizontal_range_data* takes the value "YES".

- At step **1510,** the Scalable Template Insert Manager Dialog Box **1600** is displayed on the display device **106**. The "*Critical*" check box **1610** displays a check mark if the local variable *STIM_critical* takes the value "YES"; otherwise (value "NO"), the "*Critical*" check box **1610** is kept with a blank empty display. The label box **1611** is initialised with the value of the local variable *ST_name*. The text

box **1608** is filled with the value of the local variable *STIM_height* **1706**. The label box **1607** is filled with the value of the local variable *STIM_too_high*. The 6 label boxes **1604** are filled row after row, starting with the top row, from the left to the right, with the values of the following local variables in the following order:

- *STIM_horizontal_critical*,
- *STIM_horizontal_other*,
- *STIM_horizontal_data*,
- *STIM_horizontal_range_critical*,
- *STIM_horizontal_range_other*,
- *STIM_horizontal_range_data*.

Then if the local variable *STIM_mode* takes the respective value HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, then the option button **1606**, or **1605** displays alone a black point.

Finally the "*Insert*" push-button **1603** is disabled as soon as one of the following local variables takes the value "YES": *STIM_too_high*, *STIM_horizontal_critical* (only taken into account if the local variable *STIM_mode* is equal to HORIZONTAL_INSERT), *STIM_horizontal_range_critical* (only taken into account if the local variable *STIM_mode* is equal to HORIZONTAL_INSERT_BY_RANGE); otherwise the "*Insert*" push-button **1603** is enabled.

- At step **1511**, the method is waiting for any user action on the Scalable Template Insert Manager Dialog Box **1600**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1512**, a user action on the Scalable Template Insert Manager Dialog Box **1600** is detected.
  - If the user action is a click on the "*Insert*" push-button **1603**, then control is given to step **1525**;

- if the user action is a click on the upper part of the spin button **1609**, then control is given to step **1522**;
- if the user action is a click on the lower part of the spin button **1609**, then control is given to step **1541**;
- if the user action is a click on the "*Critical*" check box **1610**, then control is given to step **1523**;
- if the user action is a click on one of the option buttons **1606**, or **1605**, then control is given to step **1524**;
- if the user action is a click on the "*Cancel*" push-button **1602**, or on the closing-window push-button **1601**, then control is given to step **1521**.

- At step **1513**, the local variable *STIM_sheet_width* **1741** is initialised with the total number of columns in the current sheet **1740**. Then another local variable *STIM_sheet_height* **1742** is initialised with the total number of rows in the current sheet **1740**. Then another local variable *STIM_mode* is initialised with the value HORIZONTAL_INSERT. Then the number of rows and of columns of the currently selected range of cells *STIM_range* **1748** is represented respectively by the local variables *STIM_height* **1746** and *STIM_width* **1745**. Then the position of the currently selected cell **1747** is first represented by the local variables *STIM_offset_width* **1743** and *STIM_offset_height* **1744** corresponding respectively to the number of columns and of rows between the top left cell of the current sheet **1740** and the currently selected cell **1747**. Then the range of cells *STIM_vertical_flushed_range* **1752** is determined as the range of cells sharing the same columns as *STIM_range* **1748**, and occupying the *STIM_height* **1746** bottom columns of the current sheet **1740**. Then the range of cells *STIM_vertical_kept_range* **1751** is determined as the range of cells sharing the same columns as *STIM_range* **1748**, and occupying the rows located between those of *STIM_range* **1743** and *STIM_vertical_flushed_range* **1752**. Then the range of cells *STIM_horizontal_flushed_range* **1750** is determined as the range of cells sharing the same rows as *STIM_range* **1748**, and occupying the *STIM_width* **1745** rightmost columns of the current sheet **1740**. Then the range of cells *STIM_horizontal_kept_range* **1749** is determined as the range of cells

sharing the same rows as *STIM_range* **1748**, and occupying the columns located between those of *STIM_range* **1748** and *STIM_horizontal_flushed_range* **1750**.

- At step **1514**, several tests are performed to evaluate the potential impact of the insertion, according to four possible insertion modes, on any already existing scalable template instance or data. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

First the HORIZONTAL_INSERT mode of insertion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1747**, or which partially overlaps the range of cells constituted by the last bottom *STIM_height* **1746** rows, or which is included in the range of cells constituted by the last bottom *STIM_height* **1746** rows, then the local test variable *STIM_horizontal_critical* takes the value "YES"; otherwise the local test variable *STIM_horizontal_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire row where is located the currently selected cell **1747**, or which partially overlaps the range of cells constituted by the last bottom *STIM_height* **1746** rows, or which is included in the range of cells constituted by the last bottom *STIM_height* **1746** rows, then the local test variable

STIM_horizontal_other takes the value "YES"; otherwise the local test variable *STIM_horizontal_other* takes the value "NO".

- If all the cells within the range of cells constituted by the last bottom *STIM_height* **1746** rows are empty (containing none data), then the local test variable *STIM_horizontal_data* takes the value "NO"; otherwise the local test variable *STIM_horizontal_data* takes the value "YES".

Second the HORIZONTAL_INSERT_BY_RANGE mode of insertion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STIM_range* **1748** and *STIM_vertical_kept_range* **1751**, or which partially overlaps the range of cells *STIM_vertical_flushed_range* **1752**, or which is included in the range of cells *STIM_vertical_flushed_range* **1752**, then the local test variable *STIM_horizontal_range_critical* takes the value "YES"; otherwise the local test variable *STIM_horizontal_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STIM_range* **1748** and *STIM_vertical_kept_range* **1751**, or which partially overlaps the range of cells *STIM_vertical_flushed_range* **1752**, or which is included in the range of cells *STIM_vertical_flushed_range* **1752**, then the local test variable *STIM_horizontal_range_other* takes the value "YES"; otherwise the local test variable *STIM_horizontal_range_other* takes the value "NO".
- If all the cells within the range of cells *STIM_vertical_flushed_range* **1752** are empty (containing none data), then the local test variable *STIM_horizontal_range_data* takes the value "NO"; otherwise the local test variable *STIM_horizontal_range_data* takes the value "YES".

Third the VERTICAL_INSERT mode of insertion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire column where is located the currently selected cell **1747**, or

which partially overlaps the range of cells constituted by the last right *STIM_width* **1745** columns, or which is included in the range of cells constituted by the last right *STIM_width* **1745** columns, then the local test variable *STIM_vertical_critical* takes the value "YES"; otherwise the local test variable *STIM_vertical_critical* takes the value "NO".

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire column where is located the currently selected cell **1747**, or which partially overlaps the range of cells constituted by the last right *STIM_width* **1745** columns, or which is included in the range of cells constituted by the last right *STIM_width* **1745** columns, then the local test variable *STIM_vertical_other* takes the value "YES"; otherwise the local test variable *STIM_vertical_other* takes the value "NO".
- If all the cells within the range of cells constituted by the last right *STIM_width* **1745** columns are empty (containing none data), then the local test variable *STIM_vertical_data* takes the value "NO"; otherwise the local test variable *STIM_vertical_data* takes the value "YES".

Fourth the VERTICAL_INSERT_BY_RANGE mode of insertion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STIM_range* **1748** and *STIM_horizontal_kept_range* **1749**, or which partially overlaps the range of cells *STIM_horizontal_flushed_range* **1750**, or which is included in the range of cells *STIM_horizontal_flushed_range* **1750**, then the local test variable *STIM_vertical_range_critical* takes the value "YES"; otherwise the local test variable *STIM_vertical_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STIM_range* **1748** and *STIM_horizontal_kept_range* **1749**, or which partially overlaps the range of cells *STIM_horizontal_flushed_range* **1750**, or which is included in the range of cells *STIM_horizontal_flushed_range* **1750**, then the local test

variable *STIM_vertical_range_other* takes the value "YES"; otherwise the local test variable *STIM_vertical_range_other* takes the value "NO".

- If all the cells within the range of cells *STIM_horizontal_flushed_range* **1750** are empty (containing none data), then the local test variable *STIM_vertical_range_data* takes the value "NO"; otherwise the local test variable *STIM_vertical_range_data* takes the value "YES".

- At step **1515**, a test is performed to check the insertion impact on any existing scalable template instance, according to the values assigned during the step **1514** to the local variables
  - *STIM_horizontal_critical*,
  - *STIM_horizontal_other*,
  - *STIM_horizontal_range_critical*,
  - *STIM_horizontal_range_other*,
  - *STIM_vertical_critical*,
  - *STIM_vertical_other*,
  - *STIM_vertical_range_critical*,
  - *STIM_vertical_range_other*.

  If none of these local variables takes the value "YES", then control is given to step **1516**; otherwise if at least one of these local variables takes the value "YES", then control is given to step **1517**.

- At step **1516**, the conventional insertion method as used and defined in conventional electronic spreadsheet environments is triggered, and then control is given back to the initial step **1501** for processing any future ***Scalable Template Instance Insertion Manager*** command.

- At step **1517**, the Scalable Template Insert Manager Dialog Box **1620** is displayed on the display device **106**. The label box **1629** is initialised with the reserved value "None". The 12 label boxes **1624** are filled row after row, starting with the top row, from the left to the right, with the values of the following local variables in the following order:
  - *STIM_horizontal_critical*,

- *STIM_horizontal_other*,
- *STIM_horizontal_data*,
- *STIM_horizontal_range_critical*,
- *STIM_horizontal_range_other*,
- *STIM_horizontal_range_data*,
- *STIM_vertical_critical*,
- *STIM_vertical_other*,
- *STIM_vertical_data*,
- *STIM_vertical_range_critical*,
- *STIM_vertical_range_other*,
- *STIM_vertical_range_data*.

Then if the local variable *STIM_mode* takes the respective value HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, or VERTICAL_INSERT, or VERTICAL_INSERT_BY_RANGE, then the option button **1628**, or **1627**, or **1626**, or **1625** displays alone a black point.

Finally the "*Insert*" push-button **1623** is disabled as soon as one of the following local variables takes the value "YES": *STIM_horizontal_critical* (only taken into account if the local variable *STIM_mode* is equal to HORIZONTAL_INSERT), *STIM_vertical_critical* (only taken into account if the local variable *STIM_mode* is equal to VERTICAL_INSERT), *STIM_horizontal_range_critical* (only taken into account if the local variable *STIM_mode* is equal to HORIZONTAL_INSERT_BY_RANGE), *STIM_vertical_range_critical* (only taken into account if the local variable *STIM_mode* is equal to VERTICAL_INSERT_BY_RANGE); otherwise the "*Insert*" push-button **1623** is enabled.

- At step **1518**, the method is waiting for any user action on the Scalable Template Insert Manager Dialog Box **1620**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1519**, a user action on the Scalable Template Insert Manager Dialog Box **1620** is detected.
  - If the user action is a click on the "*Insert*" push-button **1623**, then control is given to step **1526**;
  - if the user action is a click on one of the option buttons **1628**, or **1627**, or **1626**, or **1625**, then control is given to step **1520**;
  - if the user action is a click on the "*Cancel*" push-button **1622**, or on the closing-window push-button **1621**, then control is given to step **1521**.

- At step **1520**, the local variable *STIM_mode* takes the value HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, or VERTICAL_INSERT, or VERTICAL_INSERT_BY_RANGE if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **1628**, or **1627**, or **1626**, or **1625**. Then control is given to step **1517**.

- At step **1521**, the Scalable Template Insert Manager Dialog Box **1600** or **1620** is closed so that it disappears from the display device **106**. Finally control is given back to the initial step **1501** for processing any future ***Scalable Template Instance Insertion Manager*** command.

- At step **1522**, the local variable *STIM_height* **1706** is incremented by 1 (one), as long as the sum of its value with the value of the local variable *STIM_element* remains less than or equal to the value of the local variable *STIM_max*. If the increment has been done, then the currently selected range of cells *STIM_range* **1708** is enlarged by adding to the current selection a new row below the last one. Then control is given to step **1508**.

- At step **1523**, the local variable *STIM_critical* is updated in order to swap between the values "YES" and "NO". Then the field "*Critical*" **755** within the record **751** of the STIT table **750**, as found at step **1503** is updated with the value of the local variable *STIM_critical*. Then control is given to step **1508**.

- At step **1524**, the local variable *STIM_mode* takes the value HORIZONTAL_INSERT, or HORIZONTAL_INSERT_BY_RANGE, if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **1606**, or **1605**. Then control is given to step **1508**.

- At step **1525**, the STIT table **750** is visited to remove from it every record **751** corresponding to a scalable template instance corrupted by the insertion of the new rows, as identified during the step **1509** for the insertion mode represented by the local variable *STIM_mode*. Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**. Then control is given to the step **1527**.

- At step **1526**, the STIT table **750** is visited to remove from it every record **751** corresponding to a scalable template instance corrupted by the insertion of the new rows, as identified during the step **1514** for the insertion mode represented by the local variable *STIM_mode*. Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**. Then control is given to the step **1528**.

- At step **1527** a test is performed to check the value of the local variable *STIM_mode*. If this value is found equal to HORIZONTAL_INSERT then control is given to step **1529**, if this value is found equal to HORIZONTAL_INSERT_BY_RANGE then control is given to step **1530**.

- At step **1528** a test is performed to check the value of the local variable *STIM_mode*.
  - If this value is found equal to HORIZONTAL_INSERT then control is given to step **1531**;

- if this value is found equal to HORIZONTAL_INSERT_BY_RANGE then control is given to step **1533**;
- if this value is found equal to VERTICAL_INSERT then control is given to step **1532**;
- if this value is found equal to VERTICAL_INSERT_BY_RANGE then control is given to step **1534**.

- At step **1529**, the range of cells *STIM_range* **1708** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1747** and then a regular operation of "row insertion" is performed. Then control is given to step **1535**.

- At step **1530**, the range of cells *STIM_range_col_fit* **1721** is selected to become the currently selected range of cells, with the currently selected cell being moved to the position **1736** corresponding to the intersection of the leftmost column of the range of cells *STIM_instance_range* **1713** with the row where was previously located the currently selected cell **1707** and then a regular operation of "row insertion within selected range" is performed. Then control is given to step **1535**.

- At step **1531**, the range of cells *STIM_range* **1748** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1747** and then a regular operation of "row insertion" is performed. Then control is given to step **1521**.

- At step **1532**, the range of cells *STIM_range* **1748** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1747** and then a regular operation of "column insertion" is performed. Then control is given to step **1521**.

- At step **1533**, the range of cells *STIM_range* **1748** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1747** and then a regular operation of "row insertion within selected range" is performed. Then control is given to step **1521**.

- At step **1534**, the range of cells *STIM_range* **1748** is selected to become the currently selected range of cells, with the currently selected cell being kept in its former position **1747** and then a regular operation of "column insertion within selected range" is performed. Then control is given to step **1521**.

- At step **1535**, a local variable *STIM_index* is initialised to the value taken by the local variable *STIM_height* **1706**. Then the STT table **720** is parsed to identify the record **721** whose "*Name*" field **722** matches the value of the local variable *ST_name*. Within this record **721** is retrieved the "*Description Ptr*" field **724** allowing to locate in memory the STDT table **760** associated to the scalable template that the current scalable template instance abides by. Then the element pair **762** of element format name and element profile name found within this STDT table **760** is set as the current pair of names: (format name, profile name).

- At step **1536**, the EPT table **710** is parsed to find the record **711** whose "*Name*" field **712** is found equal to the profile name within the current pair. Once this record **711** is found, its "*Description Ptr*" field **714** is retrieved to locate in memory the range of cells illustrating the profile. This description of the profile is copy-pasted by value only onto the currently selected cell, so that the corresponding row within the range of cells *STI_range_col_fit* **1721** or **1731** receives the profile initial values. Then the EFT table **700** is parsed to find the record **701** whose "*Name*" field **702** is found equal to the format name within the current pair. Once this record **701** is found, its "*Description Ptr*" field **704** is retrieved to locate in memory the range of cells illustrating the format. This description of the format is copy-pasted by attribute only onto the currently selected cell, so that the corresponding row within the range of cells *STI_range_col_fit* **1721** or **1731** receives the format attributes.

- At step **1537**, the local variable *STIM_index* is decremented by 1 (one). Then control is given to step **1538**.

- At step **1538**, a test is performed to check if the local variable *STIM_index* is equal to 0 (zero). If it is the case, then control is given to step **1540**, otherwise control is given to step **1539**.

- At step **1539**, the currently selected cell is moved downwards by one row. Then control is given to step **1536**.

- At step **1540**, the current scalable template instance *STIM_instance_range* **1713** is updated by restoring in all the elements the "OUT" cells to prevent any corruption due to the insertion. For this purpose the element profile name found at step **1535** within the pair **762** is used to identify the record **711** within the EPT table **710** whose "*Name*" field **712** matches this element profile name. Then the "*Description Ptr*" field **714** of this same record **711** is used to retrieve in memory the profile illustrative range of cells which indicates the profile cells specified as "OUT" cells (recorded in a preferred embodiment of the present invention by setting the cell protection mode attribute to "cell protected from changes"). For this purpose, a temporary local variable *STIM_out_fields* memorises the relative positions of all the cells specified as "IN" or "OUT" cells, as an ordered set of IN or OUT values. For instance in an element profile made of 5 cells, where only the third and fifth cells are "OUT" cells, this local variable *STIM_out_fields* takes the value (IN, IN, OUT, IN, OUT). Then the top row of the inserted range of cells **1721** or **1731** is selected as the currently selected range of cells. Then each cell within this selection is individually deselected if it corresponds to a position taking the value "IN" in the local variable *STIM_out_fields*. Within this selection, the leftmost cell is set as the currently selected cell. At this stage, the current selection corresponds to the collection of all the "OUT" cells. Then the current selection is extended by adding as many rows as needed above the current one, so that it spreads over all the elements located between the top one of the scalable template instance and the top one of the inserted new elements. Then a conventional "copy-up" operation is done to copy the "OUT" cells of the last row of the current selection onto the above "OUT" cells. Then the current selection is extended by adding as many rows as needed below the last one, so that it spreads over all the elements located within the scalable template instance.

Then a conventional "copy-down" operation is done to copy the "OUT" cells of the last row of the current selection onto the below "OUT" cells, so that eventually all the "OUT" cells of the current scalable template instance receive a correct content. Finally the field "*Element #*" **754** within the record **751** of the STIT table **750**, as found at step **1503** is updated with the sum of the local variables *STIM_element* and *STIM_height* **1706**. Finally control is given to step **1521**.

- At step **1541**, the local variable *STIM_height* **1706** is decremented by 1 (one), as long as its value remains strictly positive. If the decrement has been done, then the currently selected range of cells *STIM_range* **1708** is reduced by removing from the current selection the last row. Then control is given to step **1508**.

E7. Scalable Template Instance Deletion Manager method

The method for deleting within a scalable template instance either the content of selected cells, or selected elements or even the whole scalable template instance used in the preferred embodiment of the present invention is summarised in flowchart **1800** of FIG **18**. This method can be seen as the processing of the ***Scalable Template Instance Deletion Manager*** command.

- At step **1801**, the method is in its default state, waiting for an event to initiate the process.

- At step **1802**, the ***Scalable Template Instance Deletion Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

  When the ***Scalable Template Instance Deletion Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **1803**, a test is performed to check if the currently selected cell is located within an existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance named *STDM_instance_range* and control is given to step **1804** ; otherwise control is given to step **1811**.

- At step **1804**, the record **751** found at the step **1803** is first retrieved to initialise local variables from its fields describing the scalable template instance *STDM_instance_range* to which belongs the currently selected cell: the local variable *ST_name* is initialised with the value of the field "*ST*" **753**; the local variable *STDM_element* is initialised with the value of the "*Element #*" field **754**; the local variable *STDM_critical* is initialised with the value of the "*Critical*" field **755**; the local variable *STDM_header_size* is initialised with the value of the "*Header Size*" field **756**; the local variable *STDM_footer_size* is initialised with the value of the "*Footer Size*" field **757**. Then the local variable *ST_name* is used to parse the STT table **720** in order to find the record **721** whose "*Name*" field **722** matches the parameter *ST_name*. Once this record **721** is found, its field "*Min Element #*" **725** is memorized as the local variable *STDM_min*. Then another local variable *STDM_mode* is initialised with the value DELETE_IN_FIELDS_IN_SELECTED_RANGE. Then the position of the currently selected cell is used to initialise the local variable *STDM_offset_height* corresponding to the number of rows between the top left cell of the range of cells *STDM_instance_range* and the currently selected cell . Then the number of rows of the currently selected range of cells *STDM_range* is represented by the local variable *STDM_height*.

- At step **1805**, a series of tests is performed to determine the relative position of the currently selected range of cells with respect to the current scalable template instance *STDM_instance_range*. First a local variable *STDM_header_overlap*

takes the value 1 (one) if the value of the local variable *STDM_offset_height* is less than the value of the local variable *STDM_header_size*; otherwise the local variable *STDM_header_overlap* takes the value 0 (zero). Then a local variable *STDM_footer_overlap* takes the value 1 (one) if the sum of the values of the local variables *STDM_offset_height* and *STDM_height* is found greater than the sum of the values of the local variables *STDM_header_size* and *STDM_element*. Then a local variable *STDM_body_overlap* takes the value of the formula: *STDM_header_overlap* x *STDM_data1* + (1-*STDM_header_overlap*) x *STDM_data2*, where *STDM_data1* takes the value 1 (respectively 0) if the sum of the values of the local variables *STDM_offset_height* and *STDM_height* is found greater than (respectively less than or equal to) the value of the local variable *STDM_header_size*; and where *STDM_data2* takes the value 1 (respectively 0) if the value of the local variable *STDM_offset_height* is found less than (respectively greater than or equal to) the sum of the values of the local variables *STDM_header_size* and *STDM_element*.

- At step **1806**, the number of deleted elements is evaluated to then verify that the remaining number of elements will not be too small, that is below the lower limit STDM_min. This number of deleted elements is recorded in the local variable *STDM_delete_element_#* whose value is given by the following formula:

STDM_body_overlap x (*STDM_height* - *STDM_header_overlap* x (*STDM_header_size* - *STDM_offset_height*) - *STDM_footer_overlap* x (*STDM_offset_height* + *STDM_height* - *STDM_header_size* - *STDM_element*)).

- At step **1807**, a first local variable *STDM_too_small* is set to the value "YES" if the sum of the values of the local variables *STDM_deleted_element_#* and *STDM_min* is found greater than the value of the local variable *STDM_element*; otherwise this local variable *STDM_too_small* takes the value "NO". Then a second local variable *STDM_outside_body* is set to the value "NO" if both the local variables *STDM_header_overlap* and *STDM_footer_overlap* take the value 0 (zero); otherwise this local variable *STDM_outside_body* is set to the value "YES".

- At step **1808,** the Scalable Template Delete Manager Dialog Box **1900** is displayed on the display device **106**. The "*Critical*" check box **1910** displays a check mark if the local variable *STDM_critical* takes the value "YES"; otherwise (value "NO"), the "*Critical*" check box **1910** is kept with a blank empty display. The label box **1911** is initialised with the value of the local variable *ST_name*. The text box **1908** is filled with the value of the local variable *STDM_height*. The label box **1907** is filled with the value of the local variable *STDM_too_small*, and the label box **1904** is filled with the value of the local variable *STDM_outside_body*. Then if the local variable *STDM_mode* takes the respective value
  - DELETE_IN_FIELDS_IN_SELECTED_RANGE, or
  - DELETE_IN_FIELDS_IN_SELECTED_ROWS, or
  - DELETE_SELECTED_ELEMENTS, or
  - DELETE_SELECTED_INSTANCE,

  then the option button **1905**, or **1906**, or **1912**, or **1913** displays alone a black point. Finally the "*Delete*" push-button **1903** is disabled as soon as one of the following local variables takes the value "YES": *STDM_too_high*, *STDM_outside_body*, when the local variable *STDM_mode* is equal to DELETE_SELECTED_ELEMENTS; otherwise the "*Delete*" push-button **1903** is enabled.

- At step **1809,** the method is waiting for any user action on the Scalable Template Delete Manager Dialog Box **1900**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1810**, a user action on the Scalable Template Delete Manager Dialog Box **1900** is detected.
  - If the user action is a click on the "*Delete*" push-button **1903**, then control is given to step **1824**;
  - if the user action is a click on the upper part of the spin button **1909**, then control is given to step **1821**;

- if the user action is a click on the lower part of the spin button **1909**, then control is given to step **1820**;
- if the user action is a click on the "*Critical*" check box **1910**, then control is given to step **1822**;
- if the user action is a click on one of the option buttons **1906**, or **1905**, or **1912**, or **1913**, then control is given to step **1823**;
- if the user action is a click on the "*Cancel*" push-button **1902**, or on the closing-window push-button **1901**, then control is given to step **1830**.

- At step **1811**, the local variable *STDM_mode* is initialised with the value CONTENT_DELETE. Then the number of rows and of columns of the currently selected range of cells *STDM_range* **2002** is represented respectively by the local variables *STDM_height* and *STDM_width*. Then the range of cells *STDM_right_range* **2003** is determined as the range of cells sharing the same rows as *STDM_range* **2002**, and occupying the columns located on the right of the range of cells *STDM_range* **2002**. Then the range of cells *STDM_bottom_range* **2004** is determined as the range of cells sharing the same columns as *STDM_range* **2002**, and occupying the rows located below those of *STDM_range* **2002**. Then the range of cells *STDM_left_range* **2005** is determined as the range of cells sharing the same rows as *STDM_range* **2002**, and occupying the columns located on the left of the range of cells *STDM_range* **2002**. Then the range of cells *STDM_top_range* **2006** is determined as the range of cells sharing the same columns as *STDM_range* **2002**, and occupying the rows located above those of *STDM_range* **2002**.

- At step **1812**, several tests are performed to evaluate the potential impact of the deletion, according to four possible deletion modes, on any already existing scalable template instance or data. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to

the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells also belongs to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

First the HORIZONTAL_DELETE mode of deletion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire rows where is located the currently selected range of cells *STDM_range* **2002**, or which is included in the range of cells made of the entire rows where is located the currently selected range of cells *STDM_range* **2002**, then the local test variable *STDM_horizontal_critical* takes the value "YES"; otherwise the local test variable *STDM_horizontal_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire rows where is located the currently selected range of cells *STDM_range* **2002**, or which is included in the range of cells made of the entire rows where is located the currently selected range of cells *STDM_range* **2002**, then the local test variable *STDM_horizontal_other* takes the value "YES"; otherwise the local test variable *STDM_horizontal_other* takes the value "NO".
- If all the cells within the range of cells made of the entire rows where is located the currently selected range of cells *STDM_range* **2002** are empty (containing none data), then the local test variable *STDM_horizontal_data* takes the value "NO"; otherwise the local test variable *STDM_horizontal_data* takes the value "YES".

Second the HORIZONTAL_DELETE_BY_RANGE mode of deletion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells

constituted by the concatenation of the two ranges of cells *STDM_range* **2002** and *STDM_bottom_range* **2004**, or which partially overlaps or is included in the range of cells *STDM_range* **2002**, then the local test variable *STDM_horizontal_range_critical* takes the value "YES"; otherwise the local test variable *STDM_horizontal_range_critical* takes the value "NO".

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STDM_range* **2002** and *STDM_bottom_range* **2004**, or which partially overlaps or is included in the range of cells *STDM_range* **2002**, then the local test variable *STDM_horizontal_range_other* takes the value "YES"; otherwise the local test variable *STDM_horizontal_range_other* takes the value "NO".
- If all the cells within the range of cells *STDM_range* **2002** are empty (containing none data), then the local test variable *STDM_horizontal_range_data* takes the value "NO"; otherwise the local test variable *STDM_horizontal_range_data* takes the value "YES".

Third the VERTICAL_DELETE mode of deletion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells made of the entire columns where is located the currently selected range of cells *STDM_range* **2002**, or which is included in the range of cells made of the entire columns where is located the currently selected range of cells *STDM_range* **2002**, then the local test variable *STDM_vertical_critical* takes the value "YES"; otherwise the local test variable *STDM_vertical_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells made of the entire columns where is located the currently selected range of cells *STDM_range* **2002**, or which is included in the range of cells made of the entire columns where is located the currently selected range of cells *STDM_range* **2002**, then the local test variable *STDM_vertical_other* takes the

value "YES"; otherwise the local test variable *STDM_vertical_other* takes the value "NO".

- If all the cells within the range of cells made of the entire columns where is located the currently selected range of cells *STDM_range* **2002** are empty (containing no data), then the local test variable *STDM_vertical_data* takes the value "NO"; otherwise the local test variable *STDM_vertical_data* takes the value "YES".

Fourth the VERTICAL_DELETE_BY_RANGE mode of deletion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STDM_range* **2002** and *STDM_right_range* **2003**, or which partially overlaps or is included in the range of cells *STDM_range* **2002**, then the local test variable *STDM_vertical_range_critical* takes the value "YES"; otherwise the local test variable *STDM_vertical_range_critical* takes the value "NO".
- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells constituted by the concatenation of the two ranges of cells *STDM_range* **2002** and *STDM_right_range* **2003**, or which partially overlaps or is included in the range of cells *STDM_range* **2002**, then the local test variable *STDM_vertical_range_other* takes the value "YES"; otherwise the local test variable *STDM_vertical_range_other* takes the value "NO".
- If all the cells within the range of cells *STDM_range* **2002** are empty (containing no data), then the local test variable *STDM_vertical_range_data* takes the value "NO"; otherwise the local test variable *STDM_vertical_range_data* takes the value "YES".

Fifth the CONTENT_DELETE mode of deletion is investigated.

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and whose intersection with the range of cells *STDM_range* **2002** contains at least one element or meta-element cell specified as "OUT" cell, then the local test variable *STDM_content_critical*

takes the value "YES"; otherwise the local test variable *STDM_content_critical* takes the value "NO".

- If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and whose intersection with the range of cells *STDM_range* **2002** contains at least one element or meta-element cell specified as "OUT" cell, then the local test variable *STDM_content_other* takes the value "YES"; otherwise the local test variable *STDM_content_other* takes the value "NO".
- If all the cells within the range of cells *STDM_range* **2002** are empty (containing no data), then the local test variable *STDM_content_data* takes the value "NO"; otherwise the local test variable *STDM_content_data* takes the value "YES".

- At step **1813**, a test is performed to check the deletion impact on any existing scalable template instance, according to the values assigned during the step **1812** to the local variables
  - *STDM_horizontal_critical*,
  - *STDM_horizontal_other*,
  - *STDM_horizontal_range_critical*,
  - *STDM_horizontal_range_other*,
  - *STDM_vertical_critical*,
  - *STDM_vertical_other*,
  - *STDM_vertical_range_critical*,
  - *STDM_vertical_range_other*,
  - *STDM_content_critical*,
  - *STDM_content_other*.

  If none of these local variables takes the value "YES", then control is given to step **1814**; otherwise if at least one of these local variables takes the value "YES", then control is given to step **1815**.

- At step **1814**, the conventional deletion method as used and defined in conventional electronic spreadsheet environments is triggered, and then control

is given back to the initial step **1801** for processing any future ***Scalable Template Instance Deletion Manager*** command.

- At step **1815,** the Scalable Template Delete Manager Dialog Box **1920** is displayed on the display device **106**. The label box **1929** is initialised with the reserved value "None". The 15 label boxes **1924** are filled row after row, starting with the top row, from the left to the right, with the values of the following local variables in the following order:
  - *STDM_content_critical,*
  - *STDM_content_other,*
  - *STDM_content_data,*
  - *STDM_horizontal_critical,*
  - *STDM_horizontal_other,*
  - *STDM_horizontal_data,*
  - *STDM_horizontal_range_critical,*
  - *STDM_horizontal_range_other,*
  - *STDM_horizontal_range_data,*
  - *STDM_vertical_critical,*
  - *STDM_vertical_other,*
  - *STDM_vertical_data,*
  - *STDM_vertical_range_critical,*
  - *STDM_vertical_range_other,*
  - *STDM_vertical_range_data.*

  Then if the local variable *STDM_mode* takes the respective value CONTENT_DELETE, or HORIZONTAL_DELETE, or HORIZONTAL_DELETE_BY_RANGE, or VERTICAL_DELETE, or VERTICAL_DELETE_BY_RANGE, then the option button **1930**, or **1928**, or **1927**, or **1926**, or **1925** displays alone a black point.

  Finally the "*Delete*" push-button **1923** is disabled as soon as one of the following local variables takes the value "YES":
  - *STDM_content_critical* (only taken into account if the local variable *STDM_mode* is equal to CONTENT_DELETE),

- *STDM_horizontal_critical* (only taken into account if the local variable *STDM_mode* is equal to HORIZONTAL_DELETE),
- *STDM_vertical_critical* (only taken into account if the local variable *STDM_mode* is equal to VERTICAL_DELETE),
- *STDM_horizontal_range_critical* (only taken into account if the local variable *STDM_mode* is equal to HORIZONTAL_DELETE_BY_RANGE),
- *STDM_vertical_range_critical* (only taken into account if the local variable *STDM_mode* is equal to VERTICAL_DELETE_BY_RANGE);

otherwise the "*Delete*" push-button **1923** is enabled.

- At step **1816,** the method is waiting for any user action on the Scalable Template Insert Manager Dialog Box **1920**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **1817**, a user action on the Scalable Template Insert Manager Dialog Box **1920** is detected. If the user action is a click on the "*Delete*" push-button **1923**, then control is given to step **1819**; if the user action is a click on one of the option buttons **1930**, or **1928**, or **1927**, or **1926**, or **1925**, then control is given to step **1818**; if the user action is a click on the "*Cancel*" push-button **1922**, or on the closing-window push-button **1921**, then control is given to step **1830.**

- At step **1818**, the local variable *STDM_mode* takes the value CONTENT_DELETE, or HORIZONTAL_DELETE, or HORIZONTAL_DELETE_BY_RANGE, or VERTICAL_DELETE, or VERTICAL_DELETE_BY_RANGE if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **1930**, or **1928**, or **1927**, or **1926**, or **1925**. Then control is given to step **1815.**

- At step **1819**, the STIT table **750** is visited to remove from it every record **751** corresponding to a scalable template instance corrupted by the deletion operation, as identified during the step **1812** for the deletion mode represented by the local variable *STDM_mode*. Each time such a record **751** has been

removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**. Then control is given to the step **1825**.

- At step **1820**, the local variable *STDM_height* is decremented by 1 (one), as long as its value remains strictly positive. If the decrement has been done, then the currently selected range of cells *STDM_range* is reduced by removing from the current selection the last row. Then control is given to step **1805**.

- At step **1821**, the local variable *STDM_height* is incremented by 1 (one), as long as its value remains less than the value of the local variable *STDM_element*. If the increment has been done, then the currently selected range of cells *STDM_range* is enlarged by adding to the current selection a new row below the last one. Then control is given to step **1805**.

- At step **1822**, the local variable *STDM_critical* is updated in order to swap between the values "YES" and "NO". In addition, a check mark is respectively added within or removed from the "*Critical*" check box **1910** if it was previously absent or present in this same check box **1910**. Then the field "*Critical*" **755** within the record **751** of the STIT table **750**, as found at step **1803** is updated with the value of the local variable *STDM_critical*. Then control is given to step **1805**.

- At step **1823**, the local variable *STDM_mode* takes the value "DELETE_IN_FIELDS_IN_SELECTED_RANGE", or "DELETE_IN_FIELDS_IN_SELECTED_ROWS", or "DELETE_SELECTED_ELEMENTS", or "DELETE_SELECTED_INSTANCE", if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **1905**, or **1906**, or **1912**, or **1913**. Then control is given to step **1805**.

- At step **1824** a test is performed to check the value of the local variable *STDM_mode*.

- If this value is found equal to "DELETE_IN_FIELDS_IN_SELECTED_RANGE" then control is given to step **1826**;
- if this value is found equal to "DELETE_IN_FIELDS_IN_SELECTED_ROWS" then control is given to step **1827**;
- if this value is found equal to "DELETE_SELECTED_ELEMENTS" then control is given to step **1828**;
- if this value is found equal to "DELETE_SELECTED_INSTANCE" then control is given to step **1829.**

- At step **1825** a test is performed to check the value of the local variable *STDM_mode*.
  - If this value is found equal to HORIZONTAL_DELETE then control is given to step **1831**;
  - if this value is found equal to HORIZONTAL_DELETE_BY_RANGE then control is given to step **1833**;
  - if this value is found equal to VERTICAL_DELETE then control is given to step **1832**;
  - if this value is found equal to VERTICAL_DELETE_BY_RANGE then control is given to step **1834**;
  - If this value is found equal to CONTENT_DELETE then control is given to step **1837**.

- At step **1826**, the "IN" cells belonging to the currently selected range of cells *STDM_range* are cleared. For this purpose, the "ST" field **753** of the record **751** of the STIT table **750**, as identified at step **1803**, is visited to get a memory pointer on the STDT table **760** of the scalable template, which specifies for each meta-element and for each element of the scalable template instance what is the associated profile, which in turn indicates which cells are "IN" cells and which cells are "OUT" cells. Then each row of the range of cells *STDM_range* is selected one after the other, and for each selected row, the corresponding element or meta-element profile is retrieved from the STDT table **760** to determine which cells are "IN" cells. For this purpose, a temporary local variable *STDM_out_fields* memorises the relative positions of all the cells specified as "IN" or "OUT" cells, as an ordered set of IN or OUT values. For instance in an

element profile made of 5 cells, where only the third and fifth cells are "OUT" cells, this local variable *STDM_out_fields* takes the value (IN, IN, OUT, IN, OUT). With the same example, if the selected range of cells was only occupying the second, third and fourth columns of the scalable template instance, then the first cell is ignored because although it is an "IN" cell, it falls outside the limits of the range of cells *STDM_range*, so that only the second and fourth cells are taken into account. Once the "IN" cells belonging to the range of cells *STDM_range* are determined, these cells are updated by clearing their content.

- At step **1827**, the currently selected range of cells *STDM_range* is updated in order to align its columns with those occupied by the scalable template instance *STDM_instance_range*. Then control is given to step **1826**.

- At step **1828**, the elements belonging to the rows of the currently selected range of cells *STDM_range* are removed from the current instance *STDM_instance_range*. For this purpose is first selected the range of cells constituted by the same columns as the range of cells *STDM_instance_range*, and whose rows are located between the bottom row of the range of cells *STDM_range* (excluded) and the bottom row of the range of cells *STDM_instance_range* (included). Then this selected range of cells is moved upwards, row after row, up to the position where its top row occupies the same row as the top row of the former range of cells *STDM_range*. For each step of this move, a row within the range of cells *STDM_range* is removed, so that at the end all the rows of the range of cells *STDM_range* are removed. Then control is given to step **1836**.

- At step **1829**, the range of cells corresponding to the scalable template instance *STDM_instance_range* becomes a regular ranges of cells and looses its quality of scalable template instance. For this purpose, the content of all the cells of this range of cells *STDM_instance_range* is cleared, and then this whole range of cells receives the default display attributes defined within the current spreadsheet file. Then control is given to step **1835**.

- At step **1830**, the Scalable Template Delete Manager Dialog Box **1900** or **1920** is closed so that it disappears from the display device **106**. Finally control is given back to the initial step **1801** for processing any future ***Scalable Template Instance Deletion Manager*** command.

- At step **1831**, the range of cells *STDM_range* is selected to become the currently selected range of cells so that *STDM_height* rows are selected, and then a regular operation of "row deletion" is performed. Then control is given to step **1830**.

- At step **1832**, the range of cells *STDM_range* is selected to become the currently selected range of cells so that *STDM_width* columns are selected, and then a regular operation of "column deletion" is performed. Then control is given to step **1830**.

- At step **1833**, the range of cells *STDM_range* is selected to become the currently selected range of cells so that *STDM_height* rows are selected, and then a regular operation of "row deletion within selected range" is performed. Then control is given to step **1830**.

- At step **1834**, the range of cells *STDM_range* is selected to become the currently selected range of cells so that *STDM_width* columns are selected, and then a regular operation of "column deletion within selected range" is performed. Then control is given to step **1830**.

- At step **1835**, the record **751** identified at step **1803** is removed from the STIT table **750**. Then the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is executed, before giving control to the step **1830**.

- At step **1836**, the current scalable template instance *STDM_instance_range* is updated by restoring in all the remaining elements the "OUT" cells to prevent any corruption due to the element deletion. First the STT table **720** is parsed to

identify the record **721** whose "*Name*" field **722** matches the value of the local variable *ST_name*. Within this record **721** is retrieved the "*Description Ptr*" field **724** allowing to locate in memory the STDT table **760** associated to the scalable template that the current scalable template instance *STDM_instance_range* abides by. Then the element pair **762** within this STDT table **760** is accessed to retrieve the element profile, recorded in the local variable *STDM_profile*. Then the EPT table **710** is parsed to identify a record **711** whose "*Name*" field **712** matches the local variable *STDM_profile*. Once found, the "*Description Ptr*" field **714** is used to access in memory a description of the element profile which indicates which cells are "IN" cells and which cells are "OUT" cells. For this purpose, a temporary local variable *STDM_out_fields* memorises the relative positions of all the cells specified as "OUT" cells, as an ordered set of IN or OUT values. For instance with an element profile made of 5 cells, where only the third and fifth cells are "OUT" cells, this local variable *STDM_out_fields* takes the value (IN, IN, OUT, IN, OUT). Then each "OUT" cell of the illustrative range of cells (pointed by the "*Description Ptr*" field **714** of the record **711** of the EPT table **710** whose "*Name*" **712** field matches the local variable *STDM_profile*) is individually copied and pasted onto the cell of the top element of the scalable template instance *STDM_instance_range* which has the same relative column offset within the element (corresponding to a position taking the value "OUT" in the local variable *STDM_out_fields*). Then the top element of the scalable template instance *STDM_instance_range* is selected as the currently selected range of cells. Then each cell within this selection is individually deselected if it corresponds to a position taking the value "IN" in the local variable *STDM_out_fields*. Within this selection, the leftmost cell is set as the currently selected cell. At this stage, the current selection corresponds to the collection of all the "OUT" cells. Then the current selection is extended to include as many rows as needed below the top element, so that it spreads over all the elements of the scalable template instance *STDM_instance_range*. Then a conventional "copy-down" operation is done to copy the first row onto the below ones, so that all the "OUT" cells of the current scalable template instance *STDM_instance_range* receive a correct content. Finally the "*Element #*" field **754** within the record **751** of the STIT table **750**, as found at step **1803** is

updated with the difference of the local variables *STDM_element* and *STDM_height*. Finally control is to step **1830**.

- At step **1837**, the content of every cell comprised within the currently selected range of cells *STDM_range* is cleared. Then control is given to step **1830**.

E8. Scalable Template Refresh Manager method

The method for updating the definition of existing scalable template objects (either element formats, or element profiles, or meta-element formats or meta-element profiles) so that each defined scalable template instance abiding by these objects get automatically refreshed, used in the preferred embodiment of the present invention is summarised in flowchart **2100** of FIG **21**. This method can be seen as the processing of the ***Scalable Template Refresh Manager*** command.

- At step **2101**, the method is in its default state, waiting for an event to initiate the process.

- At step **2102**, the ***Scalable Template Refresh Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

- At step **2103**, the command parameters are retrieved and memorized in local variables. The first command parameter is recorded in the local variable *STRM_name*. The second command parameter is recorded in the local variable *STRM_type*. The third optional command parameter is recorded, when present, in the local variable *STRM_old*. If the value of the local variable *STRM_type* is found equal to FORMAT, then the EFT table **700** is scanned to find the record **701** whose "*Name* " field **702** is equal to the local variable *STRM_name*. When this record **701** is found, the local variable *STRM_ref* is initialised with the value of the referenced attribute **709** of the "*Type*" field **707**; then the *STRM_new* local variable is initialised with the content of the memory location pointed by the

"*Description Ptr*" field **704**; and then the *STRM_width* local variable is initialised with the value of the "*Column #*" field **706**. If the value of the local variable *STRM_type* is found equal to PROFILE, then the EPT table **710** is scanned to find the record **711** whose "*Name* " field **712** is equal to the local variable *STRM_name*. When this record **711** is found, the local variable *STRM_ref* is initialised with the value of the referenced attribute **719** of the "*Type*" field **717**; then the *STRM_new* local variable is initialised with the content of the memory location pointed by the "*Description Ptr*" field **714**; and then the *STRM_width* local variable is initialised with the value of the "*Column #*" field **716**.

- At step **2104**, a test is performed to check if the value of the local variable *STRM_ref* is equal to instance. If it is the case, then control is given to step **2106**; otherwise control is given to step **2105**.

- At step **2105**, a warning message notification is issued for informing the user that there is no instance defined which uses the format or profile definition, so that the Refresh operation is not needed. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given back to the initial step **2101** for processing any future ***Scalable Template Refresh Manager*** command.

- At step **2106**, if the value of the local variable *STRM_type* is found equal to FORMAT, then a local variable *STRM_IN_to_IN* is initialised as a range of cells made by a single row and by a number of columns equal to the value of the local variable *STRM_width*. The n-th cell within this range of cells *STRM_IN_to_IN* takes the value "YES" if both the n-th cell of the range of cells *STRM_old* and the n-th cell of the range of cells *STRM_new* have been specified as "IN" cells; otherwise the n-th cell within this range of cells *STRM_IN_to_IN* takes the value

"NO". This local variable will be later used to determine the cells which have remained as "IN" cells.

Then regardless of the value of the local variable *STRM_type*, a conventional copy operation (both by attribute and by content) is performed from the range of cells *STRM_new* onto the clipboard. Finally the first record **721** of the STT table **720** is set as the current record in the local variable *STRM_STT_rec*.

- At step **2107**, the STDT table **760** pointed by the "*Description Ptr*" field **724** of the current record **721** *STRM_STT_rec* is set as current STDT table **760** recorded in the local variable *STRM_STDT*. Then the first pair of names **761** (format name, profile name) within the STDT table **760** *STRM_STDT* is set as the current pair recorded in the local variable *STRM_pair*. Then the local variable *STRM_offset* is initialised to the value 0 (zero), then the local variable *ST_name* is set to the value of the "*Name*" field **722** of the record **721** *STRM_STT_rec* and then the local variable *STRM_top* is set to the value of the "*Header Size*" field **756** of the record **721** *STRM_STT_rec*.

- At step **2108**, a test is performed to check if the name recorded in the local variable *STRM_name* is found in the pair of names *STRM_pair*. If it is the case, then control is given to step **2114**; otherwise control is given to step **2109**.

- At step **2109**, a test is performed to check if the current pair of names *STRM_pair* is the last pair **763** of the current STDT **760** table *STRM_STDT*. If it is the case, then control is given to step **2110**; otherwise control is given to step **2111**.

- At step **2110**, a test is performed to check if the current record **721** *STRM_STT_rec* is the last record of the STT table **720**. If it is the case, then control is given to step **2112**; otherwise control is given to step **2113**.

- At step **2111**, the pair following the current pair *STRM_pair* in the current STDT table *STRM_STDT* becomes the new current pair *STRM_pair*, and then the local

variable *STRM_offset* is incremented by 1 (one). Then control is given to step **2108**.

- At step **2112**, an information message notification is issued for informing the user that the Refresh operation is complete. This can typically be done by displaying on the display device **106** an information message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within an information message pop-up window, or any other similar means without departing from the spirit of the invention, control is given back to the initial step **2101** for processing any future ***Scalable Template Refresh Manager*** command.

- At step **2113**, the record following the current record **721** *STRM_STT_rec* in the STT table **720** becomes the new current record **721** *STRM_STT_rec*.

- At step **2114**, the first record **751** of the STIT table **750** is set as the current record in the local variable *STRM_STIT_rec*.

- At step **2115**, a test is performed to check if the value of the "*ST*" field **753** within the current record **751** *STRM_STIT_rec* is equal to the value of the local variable *ST_name*. If it is the case, then control is given to step **2118**; otherwise control is given to step **2116**.

- At step **2116**, a test is performed to check if the current record **751** *STRM_STIT_rec* is the last record of the STIT table **750**. If it is the case, then control is given to step **2109**; otherwise control is given to step **2117**.

- At step **2117**, the record following the current record **751** *STRM_STIT_rec* in the STIT table **750** becomes the new current record **751** *STRM_STIT_rec*. Then control is given to step **2115**.

- At step **2118**, the top left cell of the range of cells whose address is specified by the "*Address*" field **752** of the current record **751** *STRM_STIT_rec*, is selected. Then the selection is moved down by a number of rows equal to the value of the local variable *STRM_offset*. Then the local variable *STRM_body* is set equal to the value of the "*Element #*" field **754** of the current record **751** *STRM_STIT_rec*.

- At step **2119**, a test is performed to check if the value of the local variable *STRM_top* is found less than the value of the local variable *STRM_offset*. If it is the case, then control is given to step **2120**; otherwise control is given to step **2121**.

- At step **2120**, the currently selected cell is moved down by a number of rows equal to the value of the local variable *STRM_body* decremented by 1 (one).

- At step **2121**, a test is performed to check if the value of the local variable *STRM_type* is equal to FORMAT. If it is the case, then control is given to step **2122**; otherwise control is given to step **2125**.

- At step **2122**, a test is performed to check if the value of the local variable *STRM_top* is found equal to the value of the local variable *STRM_offset*. If it is the case, then control is given to step **2123**; otherwise control is given to step **2124**.

- At step **2123**, the current selection is extended by selecting down a number of rows equal to the value of the local variable *STRM_body* decremented by 1 (one).

- At step **2124**, a conventional paste operation by attribute is performed from the content of the clipboard onto the current selection.

- At step **2125**, a test is performed to check if the value of the local variable *STRM_top* is found equal to the value of the local variable *STRM_offset*. If it is

the case, then control is given to step **2127**; otherwise control is given to step **2126**.

- At step **2126**, the local variable *STRM_index* is set to the value 1 (one). Then control is given to step **2128**.

- At step **2127**, the local variable *STRM_index* is set to the value of the local variable *STRM_body*.

- At step **2128**, the local variable *STRM_right* is set to the value 0 (zero).

- At step **2129**, a test is performed to check if two conditions are fulfilled.
  - The first condition consists in finding in the local variable *STRM_IN_to_IN* the cell of rank *STRM_right* equal to the value "YES" (where the rank is set to zero for the left most cell, and incremented by one for each neighbour cell on the right).
  - The second condition consists in finding the content of the currently selected cell different from the cell of rank *STRM_right* in the local variable *STRM_old*.

  If both conditions are fulfilled, then control is given to step **2131**; otherwise control is given to step **2130**.

- At step **2130**, a conventional copy-paste operation by content only is performed from the cell of rank *STRM_right* within the local variable *STRM_new* onto the currently selected cell.

- At step **2131**, a test is performed to check if the value of the local variable *STRM_right* is found equal to the value of the local variable *STRM_width* decremented by 1 (one). If it is the case, then control is given to step **2133**; otherwise control is given to step **2132**.

- At step **2132**, the local variable *STRM_right* is incremented by 1 (one), and then the currently selected cell is moved right by one column. Then control is given to step **2129**.

- At step **2133**, the local variable STRM_index is decremented by 1 (one).

- At step **2134**, a test is performed to check if the value of the local variable *STRM_index* is found equal to 0 (zero). If it is the case, then control is given to step **2109**; otherwise control is given to step **2135**.

- At step **2135**, the currently selected cell is moved down by one row, and left by a number of columns equal to the value of the local variable *STRM_width* decremented by 1 (one). Then control is given to step **2128**.

E9. Scalable Template Instance Copy Manager method

The method for performing a copy operation on a source scalable template instance used in the preferred embodiment of the present invention is summarised in flowchart **2400** of FIG **24A**. This method can be seen as the processing of the ***Scalable Template Instance Copy Manager*** command.

- At step **2401**, the method is in its default state, waiting for an event to initiate the process.

- At step **2402**, the ***Scalable Template Instance Copy Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.
  When the ***Scalable Template Instance Copy Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2403**, a test is performed to check if the currently selected cell is located within any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance named *STCopyM_instance_range* and control is given to step **2404** ; otherwise control is given to step **2414**.

- At step **2404**, some local variables are initialised. The local variable *STCopyM_mode* takes the default value "RANGE". The local variable *STCopyM_offset* takes the value equal to the number of rows between the top row of the scalable template instance *STCopyM_instance_range* and the row of the currently selected cell (for instance if the currently selected cell is located on the same row as the top row of the scalable template instance *STCopyM_instance_range*, then the local variable *STCopyM_offset* takes the value 0). The local variable *STCopyM_name* takes the value of the name of the scalable template that the scalable template instance *STCopyM_instance_range* abides by. This name can be retrieved from the "*ST*" field **753** within the record **751** of the STIT table **750**, associated to the scalable template instance *STCopyM_instance_range*. The local variable *STCopyM_element* takes the value equal to the number of rows belonging both to the currently selected range of cells and to the scalable template instance *STCopyM_instance_range*. Finally the local variable *STCopyM_body* takes the value equal to the current number of elements within the scalable template instance *STCopyM_instance_range*. This number can be retrieved from the "*Element #*" field **754** within the record **751** of the STIT table **750**, associated to the scalable template instance *STCopyM_instance_range*.

- At step **2405**, the Scalable Template Instance Copy Manager Dialog Box **2300** is displayed on the display device **106**. The label box **2311** is initialised with the value of the local variable *STCopyM_name*. Then if the local variable *STCopyM_mode* takes the respective value RANGE, or ELEMENT, or INSTANCE, then

the option button **2310**, or **2309**, or **2308** displays alone a black point. Finally the three text boxes **2305**, **2306** and **2307** are initialised with the value "YES" regardless of any local variable value (these text boxes are present on the Scalable Template Instance Copy Manager Dialog Box **2300** for consistency with the Scalable Template Instance Cut Manager Dialog Box **2320** and the Scalable Template Instance Paste Manager Dialog Box **2340**).

- At step **2406**, the method is waiting for any user action on the Scalable Template Instance Copy Manager Dialog Box **2300**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2407**, a user action on the Scalable Template Instance Copy Manager Dialog Box **2300** is detected.
  - If the user action is a click on the "*Copy*" push-button **2303**, then control is given to step **2409**;
  - if the user action is a click on one of the option buttons **2310**, or **2309**, or **2308**, then control is given to step **2408**;
  - if the user action is a click on the "*Cancel*" push-button **2302**, or on the closing-window push-button **2301**, then control is given to step **2416**.

- At step **2408**, the local variable *STCopyM_mode* takes the value "RANGE", or "ELEMENT", or "INSTANCE", if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **2310**, or **2309**, or **2308**. Then control is given to step **2405**.

- At step **2409**, a test is performed to check the value of the local variable *STCopyM_mode*.
  - If this local variable is found equal to "RANGE", then control is given to step **2414**;
  - if it is found equal to "INSTANCE", then control is given to step **2412**;
  - if it is found equal to "ELEMENT", then control is given to step **2410**.

- At step **2410**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.
  - The global variable *Copy_mode* is initialised with the value "ELEMENT".
  - The global variable *Copy_name* is initialised with the value of the local variable *STCopyM_name*.
  - The global variable *Copy_offset* is initialised with the value of the local variable *STCopyM_offset*.
  - The global variable *Copy_body* is initialised with the value of the local variable *STCopyM_body*.
  - The global variable *Copy_element* is initialised with the value of the local variable *STCopyM_element*.

- At step **2411**, the currently selected range of cells is reshaped so that it first occupies all the columns and only the columns of the scalable template instance *STCopyM_instance_range* and second does occupy all rows inside and not any row outside the intersection of the scalable template instance *STCopyM_instance_range* with the previous position of the selected range of cells. Then the currently selected cell becomes the top left cell of this reshaped currently selected range of cells.

- At step **2412**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.
  - The global variable *Copy_mode* is initialised with the value "INSTANCE".
  - The global variable *Copy_name* is initialised with the value of the local variable *STCopyM_name*.
  - The global variable *Copy_offset* is initialised with the value 0 (respectively 1) if the scalable template instance *STCopyM_instance_range* is qualified as critical (respectively not critical), as specified by the "*Critical*" field **755** of the

record **751** within the STIT table **750** corresponding to this scalable template instance, field taking respectively the values "NO" and "YES".

- The global variable *Copy_body* is initialised with the value of the local variable *STCopyM_body*.
- The global variable *Copy_element* is initialised with the value 0 (zero).

- At step **2413**, the currently selected range of cells is reshaped so that it occupies the same rows and columns than the scalable template instance *STCopyM_instance_range*. Then the STIT table **750** is updated by first removing any record **751** whose "*Address*" field **752** is found equal to "CLIPBOARD", then by duplicating field by field the record **751** whose "*Address*" field **752** is equal to the address of the range of cells *STCopyM_instance_range*, and then by replacing in this newly created record **751** the "*Address*" field content by the value "CLIPBOARD". Then control is given to step **2415**.

- At step **2414**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.
  - The global variable *Copy_mode* is initialised with the value "RANGE".
  - The global variable *Copy_name* is initialised with the value "" (empty character string).
  - The global variable *Copy_offset* is initialised with the value 0 (zero).
  - The global variable *Copy_body* is initialised with the value 0 (zero).
  - The global variable *Copy_element* is initialised with the value 0 (zero).

- At step **2415**, a conventional Copy operation is performed from the currently selected range of cell onto the clipboard.

- At step **2416**, the Scalable Template Instance Copy Manager Dialog Box **2300** is closed (if it was opened) and then control is given back to the initial step **2401** for processing any future ***Scalable Template Instance Copy Manager*** command.

E10. Scalable Template Instance Cut Manager method

The method for performing a cut operation on a source scalable template instance used in a preferred embodiment of the present invention is summarised in flowchart **2420** of FIG **24B**. This method can be seen as the processing of the ***Scalable Template Instance Cut Manager*** command.

- At step **2421**, the method is in its default state, waiting for an event to initiate the process.

- At step **2422**, the ***Scalable Template Instance Cut Manager*** command is detected, as a result of an user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.
  When the ***Scalable Template Instance Cut Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2423**, a test is performed to check if the currently selected range of cells (referred to as *STCutM_range*) overlaps any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does overlap the address of the currently selected range of cells *STCutM_range*. If it is the case, then control is given to step **2424** ; otherwise control is given to step **2442**.

- At step **2424**, a test is performed to check if the currently selected cell is located within any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently

selected cell is contained in a scalable template instance named *STCutM_instance_range* and control is given to step **2425** ; otherwise control is given to step **2426**.

- At step **2425**, two local variables *STCutM_element* and *STCutM_instance* are initialised with the value "ENABLE". Then control is given to step **2427**.

- At step **2426**, two local variables *STCutM_element* and *STCutM_instance* are initialised with the value "DISABLE".

- At step **2427**, some local variables are initialised.
  - The local variable *STCutM_mode* takes the default value "RANGE".
  - If the local variable *STCutM_instance* is equal to "DISABLE", then the local variable *STCutM_offset* takes the value 0 (zero). If the local variable *STCutM_instance* is equal to "ENABLE", then the local variable *STCutM_offset* takes the value equal to the number of rows between the top row of the scalable template instance *STCutM_instance_range* and the row of the currently selected cell (for instance if the currently selected cell is located on the same row as the top row of the scalable template instance *STCutM_instance_range*, then the local variable *STCutM_offset* takes the value 0).
  - If the local variable *STCutM_instance* is equal to "DISABLE", then the local variable *STCutM_name* takes the value "NONE". If the local variable *STCutM_instance* is equal to "ENABLE", then the local variable *STCutM_name* takes the value of the name of the scalable template that the scalable template instance *STCutM_instance_range* abides by. This name can be retrieved from the "*ST*" field **753** within the record **751** of the STIT table **750**, associated to the scalable template instance *STCutM_instance_range*.
  - If the local variable *STCutM_instance* is equal to "DISABLE", then the local variable *STCutM_element* takes the value 0 (zero). If the local variable *STCutM_instance* is equal to "ENABLE", then the local variable *STCutM_element* takes the value equal to the number of rows belonging both to the currently

selected range of cells and to the scalable template instance *STCutM_instance_range*.

- Finally if the local variable *STCutM_instance* is equal to "DISABLE", then the local variable *STCutM_body* takes the value 0 (zero). If the local variable *STCutM_instance* is equal to "ENABLE", then the local variable *STCutM_body* takes the value equal to the current number of elements within the scalable template instance *STCutM_instance_range*. This number can be retrieved from the "*Element #*" field **754** within the record **751** of the STIT table **750**, associated to the scalable template instance *STCutM_instance_range*.

Then several tests are performed to evaluate the potential impact of the cut operation according to the "RANGE" mode, on any already existing scalable template instance. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the currently selected range of cells *STCutM_range*, then the local test variable *STCutM_range_critical* takes the value "YES"; otherwise the local test variable *STCutM_range_critical* takes the value "NO".

If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the currently

selected range of cells *STCutM_range*, then the local test variable *STCutM_range_other* takes the value "YES"; otherwise the local test variable *STCutM_range_other* takes the value "NO".

- At step **2428**, the Scalable Template Instance Cut Manager Dialog Box **2320** is displayed on the display device **106**. The label box **2331** is initialised with the name of the scalable template that the scalable template instance *STCutM_name* abides by.
  - If the local parameter *STCutM_element* takes the value "ENABLE", then the option button **2329** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event.
  - If the local parameter *STCutM_element* takes the value "DISABLE", then the option button **2329** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event.
  - If the local parameter *STCutM_instance* takes the value "ENABLE", then the option button **2328** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event.
  - If the local parameter *STCutM_instance* takes the value "DISABLE", then the option button **2328** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event.
  - Then if the local variable *STCutM_mode* takes the respective value "RANGE", or "ELEMENT", or "INSTANCE", then the option button **2330,** or **2329,** or **2328** displays alone a black point. Then the text box **2332** is initialised with the value of the local variable *STCutM_range_critical*. Then the text box **2333** is initialised with the value of the local variable *STCutM_range_other*. Then the text box **2325** is initialised with the value "YES" (respectively "NO") if the local variable *STCutM_range_critical* is equal to "NO" (respectively "YES"). Then the text box **2326** is initialised with the value "YES" (respectively "NO") if the local variable *STCutM_element* takes the value "ENABLE" (respectively "DISABLE"). Then the text box **2327** is initialised with the value "YES" (respectively "NO") if the local variable *STCutM_instance* takes the value "ENABLE" (respectively "DISABLE"). Finally the "*Cut*" push-button **2323** is enabled if the text box **2325** shows the value "YES" and the option button **2330** shows a black point, or if the text box

2326 shows the value "YES" and the option button **2329** shows a black point, or if the text box **2327** shows the value "YES" and the option button **2328** shows a black point.

- At step **2429**, the method is waiting for any user action on the Scalable Template Instance Cut Manager Dialog Box **2320**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2430**, a user action on the Scalable Template Instance Cut Manager Dialog Box **2320** is detected. If the user action is a click on the "*Cut*" push-button **2323**, then control is given to step **2432**; if the user action is a click on one of the option buttons **2330**, or **2329**, or **2328**, then control is given to step **2431**; if the user action is a click on the "*Cancel*" push-button **2322**, or on the closing-window push-button **2321**, then control is given to step **2445**.

- At step **2431**, the local variable *STCutM_mode* takes the value "RANGE", or "ELEMENT", or "INSTANCE", if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **2330**, or **2329**, or **2328**. Then control is given to step **2428**.

- At step **2432**, a test is performed to check the value of the local variable *STCutM_mode*.
  - If this local variable is found equal to "RANGE", then control is given to step **2442**;
  - if it is found equal to "INSTANCE", then control is given to step **2437**;
  - if it is found equal to "ELEMENT", then control is given to step **2433**.

- At step **2433**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.

- The global variable *Copy_mode* is initialised with the value "ELEMENT".
- The global variable *Copy_name* is initialised with the value of the local variable *STCutM_name*.
- The global variable *Copy_offset* is initialised with the value of the local variable *STCutM_offset*.
- The global variable *Copy_body* is initialised with the value of the local variable *STCutM_body*.
- The global variable *Copy_element* is initialised with the value of the local variable *STCutM_element*.

- At step **2434**, the currently selected range of cells *STCutM_range* is reshaped so that it first occupies all the columns and only the columns of the scalable template instance *STCutM_instance_range* and second does occupy all rows inside and not any row outside the intersection of the scalable template instance *STCutM_instance_range* with the previous position of the selected range of cells. Then the currently selected cell becomes the top left cell of this reshaped currently selected range of cells.

- At step **2435**, a conventional Copy operation is performed from the currently selected range of cell onto the clipboard.

- At step **2436**, the "IN" cells belonging to the currently selected range of cells *STCutM_range* are cleared. For this purpose, the "*ST*" field **753** of the record **751** of the STIT table **750**, as identified at step **2424**, is visited to get a memory pointer on the STDT table **760** of the scalable template, which specifies for each meta-element and for each element of the scalable template instance what is the associated profile, which in turn indicates which cells are "IN" cells and which cells are "OUT" cells. Then each row of the range of cells *STCutM_range* is selected one after the other, and for each selected row, the corresponding element or meta-element profile is retrieved from the STDT table **760** to determine which cells are "IN" cells. For this purpose, a temporary local variable *STCutM_out_fields* memorises the relative positions of all the cells specified as "IN" or "OUT" cells, as an ordered set of IN or OUT values. For instance in an

element profile made of 5 cells, where only the third and fifth cells are "OUT" cells, this local variable *STCutM_out_fields* takes the value (IN, IN, OUT, IN, OUT). Once the "IN" cells belonging to the range of cells *STCutM_range* are determined, these cells are updated by clearing their content.

- At step **2437**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.
  - The global variable *Copy_mode* is initialised with the value "INSTANCE".
  - The global variable *Copy_name* is initialised with the value of the local variable *STCutM_name*.
  - The global variable *Copy_offset* is initialised with the value 0 (respectively 1) if the scalable template instance *STCutM_instance_range* is qualified as critical (respectively not critical), as specified by the "*Critical*" field **755** of the record **751** within the STIT table **750** corresponding to this scalable template instance, field taking respectively the values "NO" and "YES".
  - The global variable *Copy_body* is initialised with the value of the local variable *STCutM_body*.
  - The global variable *Copy_element* is initialised with the value 0 (zero).

- At step **2438**, the currently selected range of cells is reshaped so that it occupies the same rows and columns than the scalable template instance *STCutM_instance_range*.

- At step **2439**, a conventional Cut operation is performed from the currently selected range of cell onto the clipboard.

- At step **2440**, the STIT table **750** is scanned to remove from it any record **751** whose "*Address*" field **752** is found equal to the value "CLIPBOARD". Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other

record **751** to be removed from the STIT table **750**. Then control is given to the step **2441**.

- At step **2441**, the record **751** within the STIT table **750** whose "*Address*" field **752** corresponds to the scalable template instance *STCutM_instance_range* is updated by setting the "*Address*" field **752** to the value "CLIPBOARD".

- At step **2442**, some global variables are initialised. In a preferred embodiment of the present invention, these global variables are preferably recorded as part of the main memory **102**, but any other similar recording means could be used instead without departing from the spirit of the invention.
  - The global variable *Copy_mode* is initialised with the value "RANGE".
  - The global variable *Copy_name* is initialised with the value "" (empty character string).
  - The global variable *Copy_offset* is initialised with the value 0 (zero).
  - The global variable *Copy_body* is initialised with the value 0 (zero).
  - The global variable *Copy_element* is initialised with the value 0 (zero).

- At step **2443**, the records **751** identified at step **2423** are removed from the STIT table **750**. Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**. Then control is given to the step **2444**.

- At step **2444**, a conventional Cut operation is performed from the currently selected range of cell onto the clipboard.

- At step **2445**, the Scalable Template Instance Cut Manager Dialog Box **2320** is closed (if it was opened) and then control is given back to the initial step **2421** for processing any future ***Scalable Template Instance Cut Manager*** command.

E11. Scalable Template Instance Paste method

The method for performing a paste operation on a destination scalable template instance used in a preferred ambodiment of the present invention is summarised in flowchart **2450** of FIG **24C**. This method can be seen as the processing of the ***Scalable Template Instance Paste Manager*** command.

- At step **2451**, the method is in its default state, waiting for an event to initiate the process.

- At step **2452**, the ***Scalable Template Instance Paste Manager*** command is detected, as a result of an user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.
  When the ***Scalable Template Instance Paste Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2453**, the destination range of cells, referred to as *dest_range*, is determined according to a conventional method.
  - If the previously copied or cut range of cells is made of a single column and of multiple rows, then *dest_range* corresponds to a range of cells occupying the same columns as the currently selected range of cells, and occupying as many rows as the range of cells previously copied or cut.
  - If the previously copied or cut range of cells is made of a single row and of multiple columns, then *dest_range* corresponds to a range of cells occupying the same rows as the currently selected range of cells, and occupying as many columns as the range of cells previously copied or cut.
  - If the previously copied or cut range of cells is made of a single cell, then *dest_range* corresponds to the currently selected range of cells.

- In all the other cases, *dest_range* occupies as many rows and columns as the previously copied or cut range of cells, with the top left cell located on the position of the currently selected cell.

Then some local variables are initialised: the local variable *STPasteM_mode* is initialised to the value "RANGE"; the local variable *STPasteM_element* is initialised to the value "DISABLE"; and the local variable *STPasteM_instance* is initialised to the value "DISABLE".

- At step **2454**, a test is performed to check if the range of cells dest_*range* overlaps any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does overlap the address of the range of cells *dest_range*. If it is the case, then control is given to step **2458** ; otherwise control is given to step **2455**.

- At step **2455**, a conventional Paste operation is performed from the clipboard onto the range of cells *dest_range*.

- At step **2456**, a test is performed to check the value of the global variable *copy_mode*. If the value of this global variable is found equal to "INSTANCE", then control is given to step **2457**; otherwise control is given to the initial step **2451** for processing any future ***Scalable Template Instance Paste Manager*** command.

- At step **2457**, the STIT table **750** is updated. The record **751** whose "*Address*" field **752** is found equal to "CLIPBOARD" is first duplicated field by field and then this just created new record **751** is updated by setting the "*Address*" field **752** to the address of the range of cells *dest_range*. Then control is given to the initial step **2451** for processing any future ***Scalable Template Instance Paste Manager*** command.

- At step **2458**, a test is performed to check the value of the global variable *copy_mode*. If the value of this global variable is found equal to "RANGE", then control is given to step **2459**; otherwise control is given to step **2460**.

- At step **2459**, a test is performed to check if the overlap area between the range of cells *dest_range* and existing scalable template instances (as identified at step **2454**) does comprise element or meta-element cells specified as "OUT" cells. If it is the case, then control is given to step **2478**; otherwise control is given to step **2477**.

- At step **2460**, a test is performed to check if the currently selected cell is located within any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance named *STPasteM_instance_range* and control is given to step **2461** ; otherwise control is given to step **2459**.

- At step **2461**, a test is performed to check the value of the global variable *copy_mode*. If the value of this global variable is found equal to "ELEMENT", then control is given to step **2462**; otherwise control is given to step **2463**.

- At step **2462**, a test is performed to check if there is any mismatch between the structure of the elements or meta-elements which were previously copied or cut onto the clipboard (referred to as the source element structure which is characterised by the global variable *copy_name*, by the global variable *copy_offset*, by the global variable *copy_element* and by the global variable *copy_body*) and the structure of the elements or meta-elements within the scalable template instance *STPasteM_instance_range* which occupy the rows of the range of cells *dest_range* (referred to as the destination element structure which is characterised by the "*ST*" field **753** of the associated record **751** within the STIT table **750**, by the relative row offset between the range of cells *dest_range* and the range of cells *STPasteM_instance_range*, and by the "*Element #*" field **754** of the associated record **751** within the STIT table **750**).

These two structures are found as different if one or both of the two following conditions are fulfilled:

- The global variable *copy_offset* is less than the "*Header Size*" field **756** and the global variable *copy_offset* is different from the relative row offset between the range of cells *dest_range* and the range of cells *STPasteM_instance_range*,
- The sum of the global variables *copy_offset* and *copy_element* is greater than the sum of the "*Header Size*" field **756** and of the global variable *copy_body* and the difference between the global variables *copy_body* and *copy_offset* is different from the difference between the "*Element #*" field **754** and the relative row offset between the range of cells *dest_range* and the range of cells *STPasteM_instance_range*.

If both structures are found different (according to the above conditions) then control is given to step **2478**; otherwise control is given to step **2464**.

- At step **2463**, a test is performed to check if there is any mismatch between the size of the scalable template instance which was previously copied or cut onto the clipboard (referred to as the source scalable template instance which is characterised by the global variable *copy_name*, by the global variable *copy_offset* and by the global variable *copy_body*) and the scalable template instance *STPasteM_instance_range* (referred to as the destination scalable template instance element structure which is characterised by the "*ST*" field **753** of the associated record **751** within the STIT table **750**, by the "Critical" field **755** of the associated record **751** within the STIT table **750**, and by the "*Element #*" field **754** of the associated record **751** within the STIT table **750**). If both instances have the same size (same number of rows and columns) then control is given to step **2465**; otherwise control is given to step **2478**.

- At step **2464**, the local variable *STPasteM_element* is initialised to the value "ENABLE", then control is given to step **2478**.

- At step **2465**, the local variable *STPasteM_instance* is initialised to the value "ENABLE", then control is given to step **2478**.

- At step **2466**, the Scalable Template Instance Paste Manager Dialog Box **2340** is displayed on the display device **106**. The label box **2351** is initialised with the name of the scalable template that the scalable template instance *STPasteM_instance_name* abides by. The label box **2354** is initialised with the value of the global variable *copy_name*.
  - If the local parameter *STPasteM_element* takes the value "ENABLE", then the push-button **2349** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event.
  - If the local parameter *STPasteM_element* takes the value "DISABLE", then the push-button **2349** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event.
  - If the local parameter *STPasteM_instance* takes the value "ENABLE", then the push-button **2348** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event.
  - If the local parameter *STPasteM_instance* takes the value "DISABLE", then the push-button **2348** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event.

Then if the local variable *STPasteM_mode* takes the respective value "RANGE", or "ELEMENT", or "INSTANCE", then the option button **2350**, or **2349**, or **2348** displays alone a black point. Then the text box **2352** is initialised with the value of the local variable *STPasteM_range_critical*. Then the text box **2353** is initialised with the value of the local variable *STPasteM_range_other*. Then the text box **2345** is initialised with the value "YES" (respectively "NO") if the local variable *STPasteM_range_critical* is equal to "NO" (respectively "YES"). Then the text box **2346** is initialised with the value "YES" (respectively "NO") if the local variable *STPasteM_element* takes the value "ENABLE" (respectively "DISABLE"). Then the text box **2347** is initialised with the value "YES" (respectively "NO") if the local variable *STPasteM_instance* takes the value "ENABLE" (respectively "DISABLE"). Finally the "*Paste*" push-button **2343** is enabled if the text box **2345** shows the value "YES" and the option button **2350** shows a black point, or if the text box **2346** shows the value "YES" and the option button **2349** shows a black point, or if

the text box **2347** shows the value "YES" and the option button **2348** shows a black point.

- At step **2467**, the method is waiting for any user action on the Scalable Template Instance Paste Manager Dialog Box **2340**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2468**, a user action on the Scalable Template Instance Paste Manager Dialog Box **2340** is detected.
  - If the user action is a click on the "*Paste*" push-button **2343**, then control is given to step **2470**;
  - if the user action is a click on one of the option buttons **2350**, or **2349**, or **2348**, then control is given to step **2469**;
  - if the user action is a click on the "*Cancel*" push-button **2342**, or on the closing-window push-button **2341**, then control is given to step **2476**.

- At step **2469**, the local variable *STPasteM_mode* takes the value "RANGE", or "ELEMENT", or "INSTANCE", if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **2350**, or **2349**, or **2348**. Then control is given to step **2466**.

- At step **2470**, a test is performed to check the value of the local variable *STPasteM_mode*.
  - If this local variable is found equal to "RANGE", then control is given to step **2471**;
  - if it is found equal to "INSTANCE", then control is given to step **2473**;
  - if it is found equal to "ELEMENT", then control is given to step **2472**.

- At step **2471**, the records **751** identified at step **2478** are removed from the STIT table **750**. Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the

Scalable Template Instanciator method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**. Then control is given to the step **2475**.

- At step **2472**, the range of cells *dest_range* is reshaped so that it first occupies all the columns and only the columns of the scalable template instance *STPasteM_instance_range* and second does occupy all rows inside and not any row outside the intersection of the scalable template instance *STPasteM_instance_range* with the previous position of the range of cells *dest_range*. Then the currently selected cell becomes the top left cell of this reshaped range of cells. Then control is given to step 2475.

- At step **2473**, the STIT table **750** is updated. First the record **751** whose "*Address*" field **751** is found equal to the address of the range of cells *STPasteM_instance_range* is deleted. Second the record **751** whose "*Address*" field **752** is found equal to "CLIPBOARD" is first duplicated field by field an then the just created new record **751** is updated by setting in the "*Address*" field **752** the address of the range of cells *STPasteM_instance_range*.

- At step **2474**, the range of cells *dest_range* is reshaped to occupy the same position than the range of cells *STPasteM_instance_range*.

- At step **2475**, a conventional Paste operation is performed from the clipboard onto the range of cells *dest_range*.

- At step **2476**, the Scalable Template Instance Paste Manager Dialog Box **2340** is closed and then control is given back to the initial step **2451** for processing any future ***Scalable Template Instance Paste Manager*** command.

- At step **2477**, a conventional Paste operation by content is performed from the clipboard onto the range of cells dest_range and then control is given back to the initial step **2451** for processing any future ***Scalable Template Instance Paste Manager*** command.

- At step **2478**, several tests are performed to evaluate the potential impact of the paste operation according to the "RANGE" mode, on any already existing scalable template instance. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

  If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially overlaps the range of cells *dest_range*, then the local test variable *STPasteM_range_critical* takes the value "YES"; otherwise the local test variable *STPasteM_range_critical* takes the value "NO".

  If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially overlaps the range of cells *dest_range*, then the local test variable *STPasteM_range_other* takes the value "YES"; otherwise the local test variable *STPasteM_range_other* takes the value "NO". Then control is given to step **2466**.

E12. Scalable Template Export Manager method

The method for exporting the definition of scalable template objects (either element formats, or element profiles, or meta-element formats or meta-element profiles or scalable templates) from a source spreadsheet file to a destination export-import spreadsheet file used in a preferred embodiment of the present invention is

summarised in flowchart **2500** of FIG **25A**. This method can be seen as the processing of the ***Scalable Template Export Manager*** command.

- At step **2501**, the method is in its default state, waiting for an event to initiate the process.

- At step **2502**, the ***Scalable Template Export Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

- At step **2503**, the Scalable Template Export Manager Dialog Box **2600** is displayed on the display device **106**. At this stage of the Scalable Template Export Manager method, the Scalable Template Export Manager Dialog Box **2600** contains only three push-buttons: the push-button "*Export in a NEW file*" **2612**, the push-button "*Export in an EXISTING file*" **2613**, and the push-button "*Cancel*" **2602**.

- At step **2504**, the method is waiting for any user action on the Scalable Template Export Manager Dialog Box **2600**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2505**, a user action on the Scalable Template Export Manager Dialog Box **2600** is detected.
  - If the user action is a click on the push-button "*Export in a NEW file*" **2612**, then control is given to step **2507**;
  - if the user action is a click on the push-button "*Export in an EXISTING file*" **2613**, then control is given to step **2508**;
  - if the user action is a click on the push-button "*Cancel*" **2602**, or on the closing-window push-button **2601**, then control is given to step **2506**.

- At step **2506**, the Scalable Template Export Manager Dialog Box **2600** is closed and then control is given back to the initial step **2501** for processing any future ***Scalable Template Export Manager*** command.

- At step **2507**, conventional means are used to interface with the spreadsheet user for creating the new spreadsheet export-import file to be created. In a preferred embodiment of the present invention, these means correspond to a conventional file creation dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention. Then control is given to step **2512**.

- At step **2508**, conventional means are used to interface with the spreadsheet user for retrieving the existing spreadsheet export-import file to be updated. In a preferred embodiment of the present invention, these means correspond to a conventional file selection dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention.

- At step **2509**, a test is performed to check if the file identified at step **2508** is a valid spreadsheet export-import file. This validity test corresponds to verifying that the identified spreadsheet file follows the logical file structure **2640** illustrated by the FIG **26C**, which is made of three parts.
  - The first part **2641** is the spreadsheet export-import file header containing a unique signature identifying a spreadsheet export-import file.
  - The second part **2642** is made of a table following the structure of a STEIT table **770**, as illustrated by FIG **7G**.

- The third and last part **2643** is the Descriptor area where are recorded the descriptions of the scalable template items (either element formats, or element profiles, or meta-element formats or meta-element profiles or scalable templates) pointed by the "*Description Ptr*" field **774** within the records **771** of the STEIT-like table recorded within the second part **2642** of the spreadsheet export-import file.

If the spreadsheet file follows this logical file structure **2640**, then control is given to step **2511**; otherwise control is given to step **2510**.

- At step **2510**, a warning message notification is issued for informing the user that the selected spreadsheet file does not comply with the structure of spreadsheet export-import files. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2503**.

- At step **2511**, the second and third parts **2642** and **2643** of the selected file are loaded into memory to constitute the STEIT table **770** and the associated object descriptions. Then some local variables are initialised:
  - the local variable *STEM_index1* is initialised to the value 1 (one);
  - the local variable *STEM_replace_all* is initialised to the value "NO";
  - the local variable *STEM_STMT_size* is initialised to the number of records **731** within the STMT table **730**;
  - the local variable *STEM_STEIT_size* is initialised to the number of records **771** within the STEIT table **770**.

Then control is given to step **2513**.

- At step **2512**, an empty STEIT table **770** is created in memory as well as the associated memory space for recording the descriptions of the scalable template

items described by records **771**. Then some local variables are initialised: the local variable *STEM_index1* is initialised to the value 1 (one); the local variable *STEM_replace_all* is initialised to the value "NO"; the local variable *STEM_STMT_size* is initialised to the number of records **731** within the STMT table **730**; the local variable *STEM_STEI_size* is initialised to 0 (zero).

- At step **2513**, the Scalable Template Export Manager Dialog Box **2600** is refreshed on the display device **106**, as the text box **2603** specifies the name of the file to which are exported scalable template items, and as the progression bar **2604** is displayed to reflect the fact that the currently processed record of the STMT table **730** is the one of rank *STEM_index1* out of a set of size *STEM_STMT_size*.

- At step **2514**, within the STMT table **730**, the record **731** whose "*Index*" field **738** has a value equal to the value of the local variable *STEM_index1*, becomes the current record *STEM_STMT_rec* **731** of the STMT table **730**.

- At step **2515**, a test is performed on the *STEM_STMT_rec* record **731** to determine if the value of the "SELECTED" attribute **742** within the "*Type*" field **737** is equal to "YES". If it is the case, then control is given to step **2517**; otherwise control is given to step **2516**.

- At step **2516**, a test is performed to check if the value of the local variable *STEM_index1* is greater than or equal to the value of the local variable *STEM_STMT_size*. If it is the case, then control is given to step **2528**; otherwise control is given to step **2527**.

- At step **2517**, the local variable *STEM_index2* is initialised to the value 1 (one).

- At step **2518**, within the STEIT table **770**, the record **771** whose "*Index*" field **778** has a value equal to the value of the local variable *STEM_index2*, becomes the current record *STEM_STEIT_rec* **771** of the STEIT table **770**.

- At step **2519**, a test is performed to check if the value of the "*Name*" field **732** of the *STEM_STMT_rec* record **731** is equal to the value of the "*Name*" field **772** of the *STEM_STEIT_rec* record **771**. If it is the case, then control is given to step **2521**; otherwise control is given to step **2520**.

- At step **2520**, a test is performed to check if the value of the local variable *STEM_index2* is greater than or equal to the value of the local variable *STEM_STEIT_size*. If it is the case, then control is given to step **2523**; otherwise control is given to step **2522**.

- At step **2521**, a test is performed to check if the local variable *STEM_replace_all* is equal to the value "YES". If it is the case, then control is given to step **2525**; otherwise control is given to step **2524**.

- At step **2522**, the local variable *STEM_index2* is incremented by 1 (one) and then control is given to step **2518**.

- At step **2523**, a new record **771** is created in the STEIT table **770**. This new record is initialised within each field **772**, **773**, **775**, **776**, **777** and **778** with the content of the respective fields **732**, **733**, **735**, **736**, **737** and **738** within the *STEM_STMT_rec* record **731**. In addition the scalable template item description, as pointed by the "*Description Ptr*" field **734** is copied within the Descriptor Area **2643**, and the "*Description Ptr*" field **774** of the *STEM_STEIT_rec* record **731** is set to the memory address of this copied descriptor. Then control is given to step **2516**.

- At step **2524**, the Scalable Template Export Manager Dialog Box **2600** is updated by displaying in a frame **2611** some information related to a conflict between a record already existing in the STEIT table **770** and a record exported from the STMT table **730**. Both records correspond to the same scalable template item whose name is displayed in the text box **2605**. The STEIT record **771** is time stamped with the date displayed in the text box **2606**, and the STMT

record **731** is time stamped with a date displayed in the text box **2607**. The spreadsheet user makes one choice out of three:

- if he/she wants to replace the existing definitions based on the STEIT table **770** by the definitions based on the STMT table **730** for all the scalable template items, then he/she click with the pointing device **105** on the "*Yes to All*" push-button **2609** and control is given to step **2526**;
- if he/she wants to replace the existing definition based on the STEIT table **770** by the definition based on the STMT table **730** for the current scalable template item, then he/she click with the pointing device **105** on the "*Yes*" push-button **2610** and control is given to step **2525**;
- if he/she does not want to replace the existing definition based on the STEIT table **770** by the definition based on the STMT table **730** for the current scalable template item, then he/she click with the pointing device **105** on the "*No*" push-button **2608** and control is given to step **2516**.

In all the three cases, the frame **2611** and the objects it contains are no longer displayed on the display device **106** as soon as the spreadsheet user clicks with the pointing device **105** on one of the three push-buttons **2608**, **2609**, and **2610**.

- At step **2525**, the *STEM_STEIT_rec* record **771** within the STEIT table **770** is replaced field by field by the *STEM_STMT_rec* record **731**: the content of each field **772**, **773**, **775**, **776**, **777** and **778** is replaced by the content of the respective fields **732**, **733**, **735**, **736**, **737** and **738** from the *STEM_STMT_rec* record **731**. In addition the scalable template item description, as pointed by the "*Description Ptr*" field **734** is copied within the Descriptor Area **2643** at the address pointed by the "*Description Ptr*" field **774** of the *STEM_STEIT_rec* record **731**. Then control is given to step **2516**.

- At step **2526**, the local variable *STEM_replace_all* is set equal to the value "YES" and then control is given to step **2525**.

- At step **2527**, the local variable *STEM_index1* is incremented by 1 (one) and then control is given to step **2513**.

- At step **2528**, the STEIT table **770** and the associated descriptions are saved on the current export-import file to respectively constitute the updated second part (STEIT-like table) **2642** and the updated third part (Descriptor Area) **2643** of the logical structure **2640** followed by the export-import file. Then control is given to step **2506**.

E13. Scalable Template Import Manager method

The method for importing the definition of scalable template objects (either element formats, or element profiles, or meta-element formats or meta-element profiles or scalable templates) from a source import-export spreadsheet file to a destination spreadsheet file used in a preferred embodiment of the present invention is summarised in flowchart **2530** of FIG **25B**. This method can be seen as the processing of the ***Scalable Template Import Manager*** command.

- At step **2531**, the method is in its default state, waiting for an event to initiate the process.

- At step **2532**, the ***Scalable Template Import Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

- At step **2533**, the Scalable Template Import Manager Dialog Box **2620** is displayed on the display device **106**. At this stage of the Scalable Template Import Manager method, the Scalable Template Import Manager Dialog Box **2620** contains only two push-buttons: the push-button "*Select an Import file*" **2632**, and the push-button "*Cancel*" **2622**.

- At step **2534**, the method is waiting for any user action on the Scalable Template Import Manager Dialog Box **2620**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not

limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2535**, a user action on the Scalable Template Import Manager Dialog Box **2620** is detected. If the user action is a click on the push-button "*Select an Import file*" **2632**, then control is given to step **2537**. If the user action is a click on the push-button "*Cancel*" **2622**, or on the closing-window push-button **2621**, then control is given to step **2536**.

- At step **2536**, the Scalable Template Import Manager Dialog Box **2620** is closed and then control is given back to the initial step **2531** for processing any future ***Scalable Template Import Manager*** command.

- At step **2537**, conventional means are used to interface with the spreadsheet user for retrieving the existing spreadsheet export-import file to be accessed. In a preferred embodiment of the present invention, these means correspond to a conventional file selection dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention.

- At step **2538**, a test is performed to check if the file identified at step **2537** is a valid spreadsheet export-import file. This validity test corresponds to verifying that the spreadsheet file follows the logical file structure **2640** illustrated by the FIG **26C**, which is made of three parts. The first part **2641** is the spreadsheet export-import file header containing a unique signature identifying a spreadsheet export-import file. The second part **2642** is made of a table following the structure of a STEIT table **770**, as illustrated by FIG **7G**. The third and last part **2643** is the Descriptor area where are recorded the descriptions of the scalable template items (either element formats, or element profiles, or meta-element formats or meta-element profiles or scalable templates) pointed by the "*Description Ptr*" field

774 within the records **771** of the STEIT-like table recorded within the second part **2642** of the export-import file. If the file follows this logical file structure **2640**, then control is given to step **2540**; otherwise control is given to step **2539**.

- At step **2539**, a warning message notification is issued for informing the user that the selected spreadsheet file does not comply with the structure of spreadsheet export-import files. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2533**.

- At step **2540**, the second and third parts **2642** and **2643** of the selected file are loaded into memory to constitute the STEIT table **770** and the associated object descriptions. Then some local variables are initialised:
  - the local variable *STIM_index1* is initialised to the value 1 (one);
  - the local variable *STIM_replace_all* is initialised to the value "NO";
  - the local variable *STIM_STMT_size* is initialised to the number of records **731** within the STMT table **730**;
  - the local variable *STIM_STEIT_size* is initialised to the number of records **771** within the STEIT table **770**.

- At step **2541**, the Scalable Template Import Manager Dialog Box **2620** is refreshed on the display device **106**, as the text box **2623** specifies the name of the file from which are imported scalable template items, and as the progression bar **2624** is displayed to reflect the fact that the currently processed record of the STEIT table **770** is the one of rank *STIM_index1* out of a set of size *STIM_STEIT_size*.

- At step **2542**, within the STEIT table **770**, the record **771** whose "*Index*" field **778** has a value equal to the value of the local variable *STIM_index1*, becomes the current record *STIM_STMT_rec* **771** of the STEIT table **770**.

- At step **2543**, the local variable *STIM_index2* is initialised to the value 1 (one).

- At step **2544**, within the STMT table **730**, the record **731** whose "*Index*" field **738** has a value equal to the value of the local variable *STIM_index2*, becomes the current record *STIM_STMT_rec* **731** of the STMT table **730**.

- At step **2545**, a test is performed to check if the value of the "*Name*" field **732** of the *STIM_STMT_rec* record **731** is equal to the value of the "*Name*" field **772** of the *STIM_STEIT_rec* record **771**. If it is the case, then control is given to step **2555**; otherwise control is given to step **2546**.

- At step **2546**, a test is performed to check if the value of the local variable *STIM_index2* is greater than or equal to the value of the local variable *STIM_STMT_size*. If it is the case, then control is given to step **2549**; otherwise control is given to step **2548**.

- At step **2547**, a test is performed to check if the local variable *STIM_replace_all* is equal to the value "YES". If it is the case, then control is given to step **2550**; otherwise control is given to step **2551**.

- At step **2548**, the local variable *STIM_index2* is incremented by 1 (one) and then control is given to step **2544**.

- At step **2549**, a new record **731** is created in the STMT table **730**. This new record is initialised within each field **732**, **733**, **735**, **736**, **737** and **738** with the content of the respective fields **772**, **773**, **775**, **776**, **777** and **778** within the *STIM_STEIT_rec* record **771**. In addition the scalable template item description, as pointed by the "*Description Ptr*" field **774** is copied in memory, and the

"*Description Ptr*" field **734** of the new record **731** is set to the memory address of this copied descriptor. Then the "NATURE" attribute **741** of the "*Type*" field **737** of the new record **731** is retrieved to determine in which table (EFT **700**, or EPT **710**, or STT **720**) a new record must also be created. If this "NATURE" attribute is found equal to "FORMAT" (respectively "TEMPLATE", or "PROFILE"), then a new record **701** (respectively **711** or **721**) is created in the EFT table **700** (respectively EPT table **710** or STT table **720**), where the fields **702**, **703**, **704**, **705**, **706**, **708**, **709** (respectively **712**, **713**, **714**, **715**, **716**, **718**, **719** or **722**, **723**, **724**, **725**, **726**, **728**, **729**) are initialised with the content of the fields **732**, **733**, **734**, **735**, **736**, **739**, **740** of the new record **731**. Then control is given to step **2553**.

- At step **2550**, the *STIM_STMT_rec* record **731** within the STMT table **730** is replaced field by field by the *STIM_STEIT_rec* record **771**: the content of each field **732**, **733**, **735**, **736**, **737** and **738** is replaced by the content of the respective fields **772**, **773**, **775**, **776**, **777** and **778** from the *STIM_STEIT_rec* record **771**. In addition the scalable template item description, as pointed by the "*Description Ptr*" field **774** is copied from the Descriptor Area **2643** at the address pointed by the "*Description Ptr*" field **734** of the *STIM_STMT_rec* record **731**. Then the "NATURE" attribute **741** of the "*Type*" field **737** of the updated record **731** is retrieved to determine in which table (EFT **700**, or EPT **710**, or STT **720**) a record must also be updated. If this "NATURE" attribute is found equal to "FORMAT" (respectively "TEMPLATE", or "PROFILE"), then the record **701** (respectively **711** or **721**) in the EFT table **700** (respectively EPT table **710** or STT table **720**), whose "*Name*" field **702** (respectively **712** or **722**) is found equal to the "*Name*" field **732**, is updated as the fields **703**, **704**, **705**, **706**, **708**, **709** (respectively **713**, **714**, **715**, **716**, **718**, **719** or **723**, **724**, **725**, **726**, **728**, **729**) are replaced by the content of the fields **733**, **734**, **735**, **736**, **739**, **740** of the updated record **731**.

  At this stage, the method can optionally be completed by invoking the ***Scalable Template Refresh Manager*** command, so that the update of the imported object (either a profile or a format according to the "NATURE" attribute) be reflected in every scalable template instance that abides by a scalable template whose definition refers to the imported format or profile, as recorded in records **701** or

710 of the EFT table **700** or EPT table **710**. The necessary steps followed for executing the ***Scalable Template Refresh Manager*** command are not recalled here as they have been already extensively described in a former section.
Then control is given to step **2553**.

- At step **2551**, the Scalable Template Import Manager Dialog Box **2620** is updated by displaying in a frame **2631** some information related to a conflict between a record already existing in the STMT table **730** and a record imported from the STEIT table **770**. Both records correspond to the same scalable template item whose name is displayed in the text box **2625**. The STEIT record **771** is time stamped with the date displayed in the text box **2627**, and the STMT record **731** is time stamped with a date displayed in the text box **2626**. The spreadsheet user makes one choice out of three:
  - if he/she wants to replace the existing definitions based on the STMT table **730** by the definitions based on the STEIT table **770** for all the scalable template items, then he/she click with the pointing device **105** on the "*Yes to All*" push-button **2629** and control is given to step **2552**;
  - if he/she wants to replace the existing definition based on the STMT table **730** by the definition based on the STEIT table **770** for the current scalable template item, then he/she click with the pointing device **105** on the "*Yes*" push-button **2630** and control is given to step **2550**;
  - if he/she does not want to replace the existing definition based on the STMT table **730** by the definition based on the STEIT table **770** for the current scalable template item, then he/she click with the pointing device **105** on the "*No*" push-button **2628** and control is given to step **2553**.

  In all the three cases, the frame **2631** and the objects it contains are no longer displayed on the display device **106** as soon as the spreadsheet user clicks with the pointing device **105** on one of the three push-buttons **2628**, **2629**, and **2630**.

- At step **2552**, the local variable *STIM_replace_all* is set equal to the value "YES" and then control is given to step **2550**.

- At step **2553**, a test is performed to check if the value of the local variable *STIM_index1* is greater than or equal to the value of the local variable *STIM_STEIT_size*. If it is the case, then control is given to step **2536**; otherwise control is given to step **2554**.

- At step **2554**, the local variable *STIM_index1* is initialised to the value 1 (one) and then control is given to step **2541**.

- At step **2555**, a test is performed to check if the value of the "REFERENCED" attribute **740** of the "*Type*" field **737** of the *STIM_STMT_rec* record **731** is equal to "TEMPLATE" or to "INSTANCE". If it is the case, then control is given to step **2556**; otherwise control is given to step **2547**.

- At step **2556**, a test is performed to check if the value of the "NATURE" attribute **741** of the "*Type*" field **737** of the *STIM_STMT_rec* record **731** is equal to "TEMPLATE". If it is the case, then control is given to step **2558**; otherwise control is given to step **2557**.

- At step **2557**, a test is performed to check if the respective values of the "META" attribute **739** of the "*Type*" field **737** of the *STIM_STMT_rec* record **731**, of the "NATURE" attribute **741** of the "*Type*" field **737** of the *STIM_STMT_rec* record **731**, and of the "*Info Field 2*" field **736** of the *STIM_STMT_rec* record **731**, are equal to the values of the "META" attribute **779** of the "*Type*" field **777** of the *STIM_STEIT_rec* record **771**, of the "NATURE" attribute **771** of the "*Type*" field **777** of the *STIM_STEIT_rec* record **771**, and of the "*Info Field 2*" field **776** of the *STIM_STEIT_rec* record **771**. If it is the case, then control is given to step **2547**; otherwise control is given to step **2558**.

- At step **2558**, a warning message notification is issued for informing the user that the currently processed scalable template object cannot be imported (replacing the scalable template object currently defined under the same name), due to the risk of corrupting the existing scalable template instances which abide by the definition of this scalable template object, upon any future update of those

scalable template instances. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2553**.

E14. Scalable Template Instance Export Manager method

The method for exporting the variable part of an existing scalable template instance from a source spreadsheet file to a destination spreadsheet instance export-import file used in a preferred embodiment of the present invention is summarised in flowchart **2800** of FIG **28A**. This method can be seen as the processing of the ***Scalable Template Instance Export Manager*** command.

- At step **2801**, the method is in its default state, waiting for an event to initiate the process.

- At step **2802**, the ***Scalable Template Instance Export Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.
  When the ***Scalable Template Instance Export Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2803**, a test is performed to check if the currently selected cell belongs to an existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance and control is given to step **2804**; otherwise control is given to the step **2836**.

- At step **2804**, several local variables are initialised.
  - The local variable *STIEM_name* is initialised with the name of the range of cells corresponding to the scalable template instance to which the currently selected cell belongs. If this scalable template instance is not a named range of cells, then the local variable *STIEM_name* defaults to an empty character string.
  - Then the local variable *STIEM_ST* is initialised with the value of the "*ST*" field **753** of the record **751** found at step **2803**.
  - Then the local variable *STIEM_body* is initialised with the value of the "*Element #*" field **754** of the record **751** found at step **2803**.
  - Then the local variable *STIEM_header* is initialised with the value of the "*Header Size*" field **756** of the record **751** found at step **2803**.
  - Then the local variable *STIEM_footer* is initialised with the value of the "*Footer Size*" field **757** of the record **751** found at step **2803**.
  - Then the local variable *STIEM_row* is initialised with the value 1 (one).
  - Then the local variable *STIEM_file* is initialised with the default value corresponding to an empty character string.
  - Then the local variable *STIEM_STI_cell* is initialised as being the top left cell of the scalable template instance to which the currently selected cell belongs.
  - Then the local variable *STIEM_STDT_rec* is initialised as being the top pair **761** of the STDT table **760** pointed by the "*Description Ptr*" field **724** of the record **721** of the STT table **720** whose "*Name*" field **722** is equal to the "*ST*" field **753** of the record **751** found at step **2803**.
  - Then the local variable *STIEM_STDT_name* is initialised with the name of the element profile or meta-element profile within the pair *STIEM_STDT_rec*.

- Then the local variable *STIEM_profile_desc* is initialised as being the descriptive range of cells pointed by the "*Description Ptr*" field **714** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIEM_STDT_name*.
- Then the local variable *STIEM_colmax* is initialised with the value of the "*Column #*" field **716** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIEM_STDT_name*.

- At step **2805**, the Scalable Template Instance Export Manager Dialog Box **2700** is displayed on the display device **106**. At this stage of the Scalable Template Instance Export Manager method, the Scalable Template Instance Export Manager Dialog Box **2700** contains only three text boxes and four push-buttons:
  - the "*Export file*" text box **2703** which is filled with the value of the local variable *STIEM_file*;
  - the "*Instance Name*" text box **2704** which is filled with the value of the local variable *STIEM_name*;
  - the "*Template Name*" text box **2705** which is filled with the value of the local variable *STIEM_ST*;
  - the push-button "*Name or Rename the Instance*" **2712**;
  - the push-button "*Export in a NEW file*" **2714**;
  - the push-button "*Export in an EXISTING file*" **2713**;
  - and the push-button "*Cancel*" **2702**.

  The two push-buttons "*Export in a NEW file*" **2714** and "*Export in an EXISTING file*" **2713** are enabled if and only if the value of the local variable *STIEM_name* differs from the default value (empty character string). Otherwise these two push-buttons are disabled, so that any click with the pointing device **105** on them will not be recognised as a valid event.

- At step **2806**, the method is waiting for any user action on the Scalable Template Instance Export Manager Dialog Box **2700**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2807**, a user action on the Scalable Template Instance Export Manager Dialog Box **2700** is detected.
  - If the user action is a click on the push-button "*Export in a NEW file*" **2714**, then control is given to step **2810**;
  - if the user action is a click on the push-button "*Export in an EXISTING file*" **2713**, then control is given to step **2811**;
  - if the user action is a click on the push-button "*Name or Rename the Instance*" **2712**, then control is given to step **2808**;
  - if the user action is a click on the push-button "*Cancel*" **2702**, or on the closing-window push-button **2701**, then control is given to step **2809**.

- At step **2808**, conventional means are used to interface with the spreadsheet user for naming the range of cells corresponding to the scalable template instance to which the currently selected cell belongs. In a preferred embodiment of the present invention, these means correspond to a conventional range name dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Once the spreadsheet user has specified a new or an updated name for the range of cells corresponding to the scalable template instance to which the currently selected cell belongs, the local variable *STIEM_name* is updated with this user specified name. Then control is given to step **2805**.

- At step **2809**, the Scalable Template Instance Export Manager Dialog Box **2700** is closed and then control is given back to the initial step **2801** for processing any future ***Scalable Template Instance Export Manager*** command.

- At step **2810**, conventional means are used to interface with the spreadsheet user for creating the new spreadsheet instance export-import file to be created. In a preferred embodiment of the present invention, these means correspond to a conventional file creation dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made

regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention. Then control is given to step **2815**.

- At step **2811**, conventional means are used to interface with the spreadsheet user for retrieving the existing spreadsheet instance export-import file to be updated. In a preferred embodiment of the present invention, these means correspond to a conventional file selection dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention.

- At step **2812**, a test is performed to check if the file identified at step **2811** is a valid spreadsheet instance export-import file. This validity test corresponds to verifying that the spreadsheet file follows the logical file structure **2750** illustrated by the FIG **27D**, which is made of three parts.
  - The first part **2751** is the spreadsheet instance export-import file header containing a unique signature identifying a spreadsheet instance export-import file.
  - The second part **2752** is made of a table following the structure of a STIEIT table **790**, as illustrated by FIG **7H**.
  - The third and last part **2753** is the Descriptor area where are recorded the exported scalable template instances, structured as ESTIT tables 2740, pointed by the "*Exported STI Ptr*" field **796** within the records **791** of the STIEIT-like table recorded within the second part **2752** of the spreadsheet instance export-import file.

  If the spreadsheet file follows this logical file structure **2750**, then control is given to step **2814**; otherwise control is given to step **2813**.

- At step **2813**, a warning message notification is issued for informing the user that the selected file does not comply with the structure of spreadsheet instance

export-import files. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2805**.

- At step **2814**, the second and third parts **2752** and **2753** of the selected file are loaded into memory to constitute the STIEIT table **790** and the associated exported scalable template instances in the form of ESTIT tables **2740.** Then the local variable *STIEM_file* is initialised to the name of the spreadsheet instance export-import file retrieved from the spreadsheet user at step **2811**. Then control is given to step **2816**.

- At step **2815**, an empty STIEIT table **790** is created in memory as well as the associated memory space for recording the exported scalable template instances in the form of ESTIT tables. Then the local variable *STIEM_file* is initialised to the name of the spreadsheet instance export-import file retrieved from the spreadsheet user at step **2810**.

- At step **2816**, the Scalable Template Instance Export Manager Dialog Box **2700** is refreshed on the display device **106**, as the text box **2703** is filled with the updated value of the local variable *STIEM_file*, and as the progression bar **2706** is displayed to reflect the fact that the currently processed row of the scalable template instance to which belongs the currently selected cell is the one of rank *STIEM_row* out of a set of size *STIEM_header + STIEM_body + STIEM_footer.*

- At step **2817**, within the STIEIT table **790**, the first record **791** becomes the current record *STIEM_STIEIT_rec* **791** of the STIEIT table **790**.

- At step **2818**, a test is performed on the *STIEM_STIEIT_rec* record **791** to determine if the value of the "*Name*" field **792** is equal to the value of the local variable *STIEM_name*. If it is the case, then control is given to step **2820**; otherwise control is given to step **2819**.

- At step **2819**, a test is performed to check if the *STIEM_STIEIT_rec* record **791** is the last record of the STIEIT table **790**. If it is the case, then control is given to step **2822**; otherwise control is given to step **2821**.

- At step **2820**, the Scalable Template Instance Export Manager Dialog Box **2700** is updated by displaying in a frame **2711** some information related to a conflict between the record *STIEM_STIEIT_rec* **791** corresponding to an exported scalable template instance already existing in the spreadsheet instance export-import file and the record **791** to be built in the STIEIT table **790** for representing the exported scalable template instance derived from the scalable template instance to which the currently selected cell belongs. Both records correspond to the same scalable template instance name which is displayed in the text box **2704**. The already existing *STIEM_STIEIT_rec* record **791** is time stamped with the date displayed in the text box **2707**, and derived from a file whose name is displayed in the text box **2708**. Being aware of these pieces of information, the spreadsheet user can take a decision:
  - if he/she wants to replace the existing exported scalable template instance based on the STIEIT table **790** by a new one derived from the current spreadsheet file, then he/she clicks with the pointing device **105** on the "*Yes*" push-button **2710** and control is given to step **2823**;
  - if he/she does not want to replace the existing exported scalable template instance based on the STIEIT table **790** by a new one derived from the current spreadsheet file, then he/she clicks with the pointing device **105** on the "*No*" push-button **2709** and control is given to step **2809**.

  In both cases, the frame **2711** and the objects it contains are no longer displayed on the display device **106** as soon as the spreadsheet user clicks with the pointing device **105** on one of the two push-buttons **2709**, and **2710**.

- At step **2821**, within the STIEIT table **790**, the record **791** which follows the record *STIEM_STIEIT_rec* **791** becomes the new current record *STIEM_STIEIT_rec* **791** of the STIEIT table **790**.

- At step **2822**, a new record **791** is created in the STIEIT table **790**. This new record becomes the record *STIEM_STIEIT_rec* **791** and is initialised as follows:
  - the "*Name*" field **792** is filled with the value of the local variable *STIEM_name*;
  - the "*Source File Name*" field **793** is filled with the name of the current spreadsheet file which can be retrieved by conventional means from the spreadsheet environment system information repository;
  - the "*Export Date*" field **794** is filled with the current date and time which can be retrieved by conventional means from the spreadsheet environment system information repository;
  - the "*Row #*" field **795** is filled with the sum of the values of the three local variables *STIEM_header*, *STIEM_body* and *STIEM_footer*;
  - the "*Exported STI Ptr*" field **796** is filled with the memory address of the allocated memory space where the ESTIT table **2740** will record the exported scalable template instance.

  Then the local variable *STIEM_ESTI_cell* is initialised as being the top left cell of the ESTIT table **2740**. Then control is given to step **2824**.

- At step **2823**, the record *STIEM_STIEIT_rec* **791** is updated in the STIEIT table **790**. The "*Source File Name*" field **793** is filled with the name of the current spreadsheet file which can be retrieved by conventional means from the spreadsheet environment system information repository; the "*Export Date*" field **794** is filled with the current date and time which can be retrieved by conventional means from the spreadsheet environment system information repository; the "*Row #*" field **795** is filled with the sum of the values of the three local variables *STIEM_header*, *STIEM_body* and *STIEM_footer*. Then the local variable *STIEM_ESTI_cell* is initialised as being the top left cell of the ESTIT table **2740**.

- At step **2824**, some local variables are initialised: the local variable *STIEM_col* is initialised to the value 1 (one); the local variable *STIEM_export_col* is initialised

to the value 1 (one); the local variable *STIEM_profile_cell* is initialised as being the leftmost cell within the range of cells *STIEM_profile_desc*.

- At step **2825**, a test is performed to check if *STIEM_profile_cell* has been defined as an "IN" cell. If it is the case, then control is given to step **2826**; otherwise control is given to step **2827**.

- At step **2826**, a conventional copy-paste operation by value is performed from the individual cell *STIEM_STI_cell* onto the individual cell *STIEM_ESTI_cell*. Then the individual cell located immediately at the right of *STIEM_ESTI_cell* becomes the new cell *STIEM_ESTI_cell*. Then the local variable *STIEM_export_col* is incremented by 1 (one).

- At step **2827**, the individual cell located immediately at the right of *STIEM_STI_cell* becomes the new cell *STIEM_STI_cell*. The individual cell located immediately at the right of *STIEM_profile_cell* becomes the new cell *STIEM_profile_cell*. Then the local variable *STIEM_col* is incremented by 1 (one).

- At step **2828**, a test is performed to determine if the value of the local variable *STIEM_col* is greater than the value of the local variable *STIEM_colmax*. If it is the case, then control is given to step **2829**; otherwise control is given to step **2825**.

- At step **2829**, the individual cell located on the left of *STIEM_ESTI_cell* by a number of columns equal to the value of the local variable *STIEM_export_col* becomes the new cell *STIEM_ESTI_cell*. Then the individual cell *STIEM_ESTI_cell* is filled with the value of the local variable *STIEM_export_col*. Then the individual cell located immediately at the right of *STIEM_ESTI_cell* becomes the new cell *STIEM_ESTI_cell*.

- At step **2830**, a test is performed to determine if the value of the local variable *STIEM_row* is greater than or equal to the sum of the values of the three local

variables *STIEM_header, STIEM_body, STIEM_footer.* If it is the case, then control is given to step **2835**; otherwise control is given to step **2831**.

- At step **2831**, the individual cell located on the left of *STIEM_STI_cell* by a number of columns equal to the value of the local variable *STIEM_col* decremented by 1 (one) becomes the new cell *STIEM_STI_cell.* Then the individual cell located immediately below *STIEM_STI_cell* becomes the new cell *STIEM_STI_cell.* Then the individual cell located immediately below *STIEM_ESTI_cell* becomes the new cell *STIEM_ESTI_cell.*

- At step **2832**, a test is performed to determine if the value of the local variable *STIEM_row* is less than or equal to the value of the local variable *STIEM_header.* If it is the case, then control is given to step **2834**; otherwise control is given to step **2833**.

- At step **2833**, a test is performed to determine if the value of the local variable *STIEM_row* is greater than or equal to the sum of the values of the two local variables *STIEM_header, STIEM_body.* If it is the case, then control is given to step **2834**; otherwise control is given to step **2837**.

- At step **2834**, in the STDT table **760**, the pair which follows the *STIEM_STDT_rec* pair becomes the new pair *STIEM_STDT_rec.* Then the local variable *STIEM_STDT_name* is initialised with the name of the element profile or meta-element profile within the pair *STIEM_STDT_rec.* Then the local variable *STIEM_profile_desc* is initialised as being the descriptive range of cells pointed by the "*Description Ptr*" field **714** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIEM_STDT_name.* Then control is given to step **2837**.

- At step **2835**, the STIEIT table **790** and the associated exported scalable template instances recorded in ESTIT tables **2740** are saved on the current spreadsheet instance export-import file to respectively constitute the updated second part (STIEIT-like table) **2752** and the updated third part (Descriptor Area)

2753 of the logical structure **2750** followed by the spreadsheet instance export-import file. Then control is given to step **2809**.

- At step **2836**, a warning message notification is issued for informing the user that the scalable template instance export operation can only be performed if the currently selected cell is located within an existing scalable template instance. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to the initial step **2801** for processing any future ***Scalable Template Instance Export Manager*** command.

- At step **2837**, the local variable *STIEM_row* is incremented by 1 (one). Then the Scalable Template Instance Export Manager Dialog Box **2700** is refreshed on the display device **106**, as the progression bar **2706** is displayed to reflect the fact that the currently processed row of the scalable template instance to which belongs the currently selected cell is the one of rank *STIEM_row* out of a set of size *STIEM_header + STIEM_body + STIEM_footer*. Then control is given to step **2824**.

E15. Scalable Template Instance Import Manager method

The method for importing the variable part of an existing scalable template instance from a source spreadsheet file to a destination spreadsheet instance export-import file used in a preferred embodiment of the present invention is summarised in flowchart **2840** of FIG **28B**. This method can be seen as the processing of the ***Scalable Template Instance Import Manager*** command.

- At step **2841**, the method is in its default state, waiting for an event to initiate the process.

- At step **2842**, the ***Scalable Template Instance Import Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.
  When the ***Scalable Template Instance Import Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2843**, a test is performed to check if the currently selected cell belongs to an existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance and control is given to step **2844**; otherwise control is given to step **2873**.

- At step **2844**, several local variables are initialised.
  - The local variable *STIIM_name* is initialised with the name of the range of cells corresponding to the scalable template instance to which the currently selected cell belongs. If this scalable template instance is not a named range of cells, then the local variable *STIIM_name* defaults to an empty character string.
  - Then the local variable *STIIM_ST* is initialised with the value of the "*ST*" field **753** of the record **751** found at step **2843**.
  - Then the local variable *STIIM_body* is initialised with the value of the "*Element #*" field **754** of the record **751** found at step **2843**.

- Then the local variable *STIIM_header* is initialised with the value of the "*Header Size*" field **756** of the record **751** found at step **2843**.
- Then the local variable *STIIM_footer* is initialised with the value of the "*Footer Size*" field **757** of the record **751** found at step **2843**.
- Then the local variable *STIIM_row* is initialised with the value 1 (one).
- Then the local variable *STIIM_file* is initialised with the default value corresponding to an empty character string.
- Then the local variable *STIIM_STI_cell* is initialised as being the top left cell of the scalable template instance to which the currently selected cell belongs.
- Then the local variable *STIIM_STDT_rec* is initialised as being the top pair **761** of the STDT table **760** pointed by the "*Description Ptr*" field **724** of the record **721** of the STT table **720** whose "*Name*" field **722** is equal to the "*ST*" field **753** of the record **751** found at step **2843**.
- Then the local variable *STIIM_STDT_name* is initialised with the name of the element profile or meta-element profile within the pair *STIIM_STDT_rec*.
- Then the local variable *STIIM_profile_desc* is initialised as being the descriptive range of cells pointed by the "*Description Ptr*" field **714** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIIM_STDT_name*.
- Then the local variable *STIIM_colmax* is initialised with the value of the "*Column #*" field **716** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIIM_STDT_name*.

- At step **2845**, the Scalable Template Instance Import Manager Dialog Box **2720** is displayed on the display device **106**. At this stage of the Scalable Template Instance Import Manager method, the Scalable Template Instance Import Manager Dialog Box **2720** comprises only three text boxes and three push-buttons:
  - the "*Import file*" text box **2723** which is filled with the value of the local variable *STIIM_file*;
  - the "*Instance Name*" text box **2724** which is filled with the value of the local variable *STIIM_name*;

- the "*Template Name*" text box **2725** which is filled with the value of the local variable *STIIM_ST*;
- the push-button "*Name or Rename the Instance*" **2727**;
- the push-button "*Select an Import File*" **2728**;
- the push-button "*Cancel*" **2722**.

The push-button "*Select an Import File*" **2728** is enabled if and only if the value of the local variable *STIIM_name* differs from the default value (empty character string). Otherwise this push-button is disabled, so that any click with the pointing device **105** on it will not be recognised as a valid event.

- At step **2846**, the method is waiting for any user action on the Scalable Template Instance Import Manager Dialog Box **2720**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2847**, a user action on the Scalable Template Instance Import Manager Dialog Box **2720** is detected. If the user action is a click on the push-button "*Select an Import File*" **2728**, then control is given to step **2850**. If the user action is a click on the push-button "*Name or Rename the Instance*" **2727**, then control is given to step **2848**. If the user action is a click on the push-button "*Cancel*" **2722**, or on the closing-window push-button **2721**, then control is given to step **2849**.

- At step **2848**, conventional means are used to interface with the spreadsheet user for naming the range of cells corresponding to the scalable template instance to which the currently selected cell belongs. In a preferred embodiment of the present invention, these means correspond to a conventional range name dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Once the spreadsheet user has specified a new or an updated name for the range of cells corresponding to the scalable template instance to which

the currently selected cell belongs, the local variable *STIIM_name* is updated with this user specified name. Then control is given to step **2845**.

- At step **2849**, the Scalable Template Instance Import Manager Dialog Box **2720** is closed and then control is given back to the initial step **2841** for processing any future ***Scalable Template Instance Import Manager*** command.

- At step **2850**, conventional means are used to interface with the spreadsheet user for retrieving the existing spreadsheet instance export-import file to be accessed. In a preferred embodiment of the present invention, these means correspond to a conventional file selection dialog box displayed on the display device **106**, but any other similar conventional means could be used instead without departing from the spirit of the invention. Furthermore no specific assumption is made regarding the file structure used in the environment where the spreadsheet application is running, as any conventional file structure can be used without influencing the spirit of the invention.

- At step **2851**, a test is performed to check if the file identified at step **2850** is a valid spreadsheet instance export-import file. This validity test corresponds to verifying that the spreadsheet file follows the logical file structure **2750** illustrated by the FIG **27D**, which is made of three parts.
  - The first part **2751** is the spreadsheet instance export-import file header containing a unique signature identifying a spreadsheet instance export-import file.
  - The second part **2752** is made of a table following the structure of a STIEIT table **790**, as illustrated by FIG **7H**.
  - The third and last part **2753** is the Descriptor area where are recorded the exported scalable template instances, structured as ESTIT tables **2740**, pointed by the "*Exported STI Ptr*" fields **796** within the records **791** of the STIEIT-like table recorded within the second part **2752** of the spreadsheet instance export-import file.

  If the spreadsheet file follows this logical file structure **2750**, then control is given to step **2853**; otherwise control is given to step **2852**.

- At step **2852**, a warning message notification is issued for informing the user that the selected file does not comply with the structure of spreadsheet instance export-import files. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2845**.

- At step **2853**, the second and third parts **2752** and **2753** of the selected file are loaded into memory to constitute the STIEIT table **790** and the associated exported scalable template instances in the form of ESTIT tables **2740**. Then the local variable *STIIM_file* is initialised to the name of the spreadsheet instance export-import file retrieved from the spreadsheet user at step **2850**.

- At step **2854**, the Scalable Template Instance Import Manager Dialog Box **2720** is refreshed on the display device **106**, as the text box **2723** is filled with the updated value of the local variable *STIIM_file*, and as the progression bar **2726** is displayed to reflect the fact that the currently processed row of the scalable template instance to which belongs the currently selected cell is the one of rank *STIIM_row* out of a set of size *STIIM_header* + *STIIM_body* + *STIIM_footer*.

- At step **2855**, within the STIEIT table **790**, the first record **791** becomes the current record *STIIM_STIEIT_rec* **791** of the STIEIT table **790**.

- At step **2856**, a test is performed on the *STIIM_STIEIT_rec* record **791** to determine if the value of the "*Name*" field **792** is equal to the value of the local variable *STIIM_name*. If it is the case, then control is given to step **2872**; otherwise control is given to step **2857**.

- At step **2857**, a test is performed to check if the *STIIM_STIEIT_rec* record **791** is the last record of the STIEIT table **790**. If it is the case, then control is given to step **2858**; otherwise control is given to step **2859**.

- At step **2858**, a warning message notification is issued for informing the user that the selected file does not comprise any exported scalable template instance that shares the same name as the scalable template instance to which the currently selected cell belongs. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to step **2845**.

- At step **2859**, within the STIEIT table **790**, the record **791** which follows the record *STIIM_STIEIT_rec* **791** becomes the new current record *STIIM_STIEIT_rec* **791** of the STIEIT table **790**.

- At step **2860**, some local variables are initialised:
  - the local variable *STIIM_col* is initialised to the value 1 (one);
  - the local variable *STIIM_export_col* is initialised to the value 1 (one);
  - the local variable *STIIM_profile_cell* is initialised as being the leftmost cell within the range of cells *STIIM_profile_desc*;
  - the local variable *STIIM_export_col_max* is initialised with the content of the individual cell *STIIM_ESTI_cell*.

  Then the individual cell located immediately at the right of *STIIM_ESTI_cell* becomes the new cell *STIIM_ESTI_cell*.

- At step **2861**, a test is performed to check if *STIIM_profile_cell* has been defined as an "IN" cell. If it is the case, then control is given to step **2862**; otherwise control is given to step **2863**.

- At step **2862**, a conventional copy-paste operation by value is performed from the individual cell *STIIM_ESTI_cell* onto the individual cell *STIIM_STI_cell*. Then the individual cell located immediately at the right of *STIIM_ESTI_cell* becomes the new cell *STIIM_ESTI_cell*. Then the local variable *STIIM_export_col* is incremented by 1 (one).

- At step **2863**, the individual cell located immediately at the right of *STIIM_STI_cell* becomes the new cell *STIIM_STI_cell*. The individual cell located immediately at the right of *STIIM_profile_cell* becomes the new cell *STIIM_profile_cell*. Then the local variable *STIIM_col* is incremented by 1 (one).

- At step **2864**, a test is performed to determine if the value of the local variable *STIIM_col* is greater than the value of the local variable *STIIM_colmax*. If it is the case, then control is given to step **2866**; otherwise control is given to step **2865**.

- At step **2865**, a test is performed to determine if the value of the local variable *STIIM_export_col* is greater than the value of the local variable *STIIM_export_col_max*. If it is the case, then control is given to step **2866**; otherwise control is given to step **2861**.

- At step **2866**, a test is performed to determine if the value of the local variable *STIIM_row* is greater than or equal to the sum of the values of the three local variables *STIIM_header, STIIM_body, STIIM_footer*, or if the value of the local variable *STIIM_row* is greater than or equal to the value of the local variable *STIIM_row_max*. If it is the case, then control is given to step **2849**; otherwise control is given to step **2867**.

- At step **2867**, the individual cell located on the left of *STIIM_STI_cell* by a number of columns equal to the value of the local variable *STIIM_col* decremented by 1 (one) becomes the new cell *STIIM_STI_cell*. Then the individual cell located immediately below *STIIM_STI_cell* becomes the new cell *STIIM_STI_cell*. Then the individual cell located on the left of *STIIM_ESTI_cell*

by a number of columns equal to the value of the local variable *STIIM_export_cell* becomes the new cell *STIIM_ESTI_cell*. Then the individual cell located immediately below *STIIM_ESTI_cell* becomes the new cell *STIIM_ESTI_cell*.

- At step **2868**, a test is performed to determine if the value of the local variable *STIIM_row* is less than or equal to the value of the local variable *STIIM_header*. If it is the case, then control is given to step **2870**; otherwise control is given to step **2869**.

- At step **2869**, a test is performed to determine if the value of the local variable *STIIM_row* is greater than or equal to the sum of the values of the two local variables *STIIM_header, STIIM_body*. If it is the case, then control is given to step **2870**; otherwise control is given to step **2871**.

- At step **2870**, in the STDT table **760**, the pair which follows the *STIIM_STDT_rec* pair becomes the new pair *STIIM_STDT_rec*. Then the local variable *STIIM_STDT_name* is initialised with the name of the element profile or meta-element profile within the pair *STIIM_STDT_rec*. Then the local variable *STIIM_profile_desc* is initialised as being the descriptive range of cells pointed by the "*Description Ptr*" field **714** of the record **711** of the EPT table **710**, whose "*Name*" field **712** is equal to the local variable *STIIM_STDT_name*.

- At step **2871**, the local variable *STIIM_row* is incremented by 1 (one). Then the Scalable Template Instance Import Manager Dialog Box **2720** is refreshed on the display device **106**, as the progression bar **2726** is displayed to reflect the fact that the currently processed row of the scalable template instance to which belongs the currently selected cell is the one of rank *STIIM_row* out of a set of size *STIIM_header + STIIM_body + STIIM_footer*. Then control is given to step **2860**.

- At step **2872**, the local variable *STIIM_row_max* is initialised to the value of the "*Row #*" field **795** of the *STIIM_STIEIT_rec* record **791** identified at step **2856**.

Then the local variable *STIIM_ESTI_cell* is initialised as being the leftmost cell **2742** of the top record **2741** of the ESTIT table **2740** pointed by the "*Exported STI Ptr*" field **796** of the *STIIM_STIEIT_rec* record **791** identified at step **2856**. Then control is given to step **2860**.

- At step **2873**, a warning message notification is issued for informing the user that the scalable template instance import operation can only be performed if the currently selected cell is located within an existing scalable template instance. This can typically be done by displaying on the display device **106** a warning message in a pop-up window, or in a status bar area, but any other similar means could be used instead, without departing from the spirit of the invention. Once the user has acknowledged this notification message through conventional means such as clicking with the pointing device **105** on an "OK" push-button present within a warning message pop-up window, or any other similar means without departing from the spirit of the invention, control is given to the initial step **2841** for processing any future ***Scalable Template Instance Import Manager*** command.

E16. Scalable Template Instance Sort Application Manager method

The method for performing a sorting application on a scalable template instance used in a preferred embodiment of the present invention can be summarised in flowchart **2900** of FIG **29A**. This method can be seen as the processing of the ***Scalable Template Instance Sort Application Manager*** command.

- At step **2901**, the method is in its default state, waiting for an event to initiate the process.

- At step **2902**, the ***Scalable Template Instance Sort Application Manager*** command is detected, as a result of a user action. This action can be for instance a specific combination of key on the keyboard **104**, or the click of the pointing device **105** on a specific button, or any other similar means not further specified here.

When the ***Scalable Template Instance Sort Application Manager*** command is detected, the current spreadsheet selection corresponds to a range of cells, possibly reduced to a single individual cell, which is known as the currently selected range of cells and which comprises the currently selected cell. If this currently selected cell is not the top left cell within the currently selected range of cells, then the top left cell of the currently selected range of cells becomes the currently selected cell.

- At step **2903**, a test is performed to check if the currently selected range of cells (referred to as *STISM_range*) overlaps any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does overlap the address of the currently selected range of cells *STISM_range*. If it is the case, then control is given to step **2904** ; otherwise control is given to step **2917**.

- At step **2904**, a test is performed to check if the currently selected cell is located within any existing scalable template instance. This test is performed by parsing the STIT table **750** and visiting in each record **751** the "*Address*" field **752** to determine if the range of cells address specified in this field does include the address of the individual currently selected cell. If it is the case, then the currently selected cell is contained in a scalable template instance named *STISM_instance_range* and control is given to step **2905** ; otherwise control is given to step **2906**.

- At step **2905**, two local variables *STISM_element* and *STISM_instance* are initialised with the value "ENABLE". Then the local variable *STISM_mode* takes the default value "ELEMENT". Then control is given to step **2907**.

- At step **2906**, two local variables *STISM_element* and *STISM_instance* are initialised with the value "DISABLE". Then the local variable *STISM_mode* takes the default value "RANGE".

- At step **2907**, if the local variable *STISM_instance* is equal to "DISABLE", then the local variable *STISM_name* takes the value "NONE". If the local variable *STISM_instance* is equal to "ENABLE", then the local variable *STISM_name* takes the value of the name of the scalable template which is abided by the scalable template instance *STISM_instance_range*. This name can be retrieved from the "*ST*" field **753** within the record **751** of the STIT table **750**, associated to the scalable template instance *STISM_instance_range*.

Then several tests are performed to evaluate the potential impact of the sorting application according to the "RANGE" mode, on any already existing scalable template instance. These tests require to parse the STIT table **750**, and to visit each record **751** to learn the address ("*Address*" field **752**) and the importance ("*Critical*" field **755**) of every already defined scalable template instance. These tests evaluate either if two given ranges of cells partially overlap (meaning that there exist in the first range of cells at least one cell belonging to the second range of cells and at least one cell not belonging to the second range of cells) or if a first given range of cells is included within a second given range of cells (meaning that every cell belonging to the first range of cells belongs too to the second range of cells). Different conventional range comparison techniques can be used for evaluating either range partial overlapping or range inclusion, without departing from the spirit of the present invention; they will not be described in the preferred embodiment of the present invention.

If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "YES" and which partially or totally overlaps the currently selected range of cells *STISM_range*, then the local test variable *STISM_range_critical* takes the value "YES"; otherwise the local test variable *STISM_range_critical* takes the value "NO".

If there exists at least one existing scalable template instance whose "*Critical*" field **755** takes the value "NO" and which partially or totally overlaps the currently selected range of cells *STISM_range*, then the local test variable

STISM_range_other takes the value "YES"; otherwise the local test variable *STISM_range_other* takes the value "NO".

- At step **2908**, the Scalable Template Instance Sort Manager Dialog Box **2920** is displayed on the display device **106**. The label box **2931** is initialised with the name of the scalable template that the scalable template instance *STISM_name* abides by. If the local parameter *STISM_element* takes the value "ENABLE", then the option button **2929** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event. If the local parameter *STISM_element* takes the value "DISABLE", then the option button **2929** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event. If the local parameter *STISM_instance* takes the value "ENABLE", then the option button **2928** is enabled, meaning that any future click on it with the pointing device **105** will be recognised as a valid event. If the local parameter *STISM_instance* takes the value "DISABLE", then the option button **2928** is disabled, meaning that any future click on it with the pointing device **105** will not be recognised as a valid event. Then if the local variable *STISM_mode* takes the respective value "RANGE", or "ELEMENT", or "INSTANCE", then the option button **2930**, or **2929**, or **2928** displays alone a black point. Then the text box **2932** is initialised with the value of the local variable *STISM_range_critical*. Then the text box **2933** is initialised with the value of the local variable *STISM_range_other*. Then the text box **2925** is initialised with the value "YES" (respectively "NO") if the local variable *STISM_range_critical* is equal to "NO" (respectively "YES"). Then the text box **2926** is initialised with the value "YES" (respectively "NO") if the local variable *STISM_element* takes the value "ENABLE" (respectively "DISABLE"). Then the text box **2927** is initialised with the value "YES" (respectively "NO") if the local variable *STISM_instance* takes the value "ENABLE" (respectively "DISABLE"). Finally the "*Sort*" push-button **2923** is enabled if the text box **2925** shows the value "YES" and the option button **2930** shows a black point, or if the text box **2926** shows the value "YES" and the option button **2929** shows a black point, or if the text box **2927** shows the value "YES" and the option button **2928** shows a black point.

- At step **2909**, the method is waiting for any user action on the Scalable Template Instance Sort Manager Dialog Box **2920**. Such user action is typically resulting from a click with the pointing device **105**, but take other similar forms such as, but not limited to a specific combination of key on the keyboard **104**, or any other similar means not further specified here.

- At step **2910**, a user action on the Scalable Template Instance Sort Manager Dialog Box **2920** is detected.
  - If the user action is a click on the "*Sort*" push-button **2923**, then control is given to step **2913**;
  - if the user action is a click on one of the option buttons **2930**, or **2929**, or **2928**, then control is given to step **2911**;
  - if the user action is a click on the "*Cancel*" push-button **2922**, or on the closing-window push-button **2921**, then control is given to step **2912**.

- At step **2911**, the local variable *STISM_mode* takes the value "RANGE", or "ELEMENT", or "INSTANCE", if the spreadsheet user has respectively clicked with the pointing device **105** on the option button **2930**, or **2929**, or **2928**. Then control is given to step **2908**.

- At step **2912**, the Scalable Template Instance Sort Manager Dialog Box **2920** is closed (if it was opened) and then control is given back to the initial step **2901** for processing any future ***Scalable Template Instance Sort Application Manager*** command.

- At step **2913**, a test is performed to check the value of the local variable *STISM_mode*. If this local variable is found equal to "RANGE", then control is given to step **2916**; if it is found equal to "INSTANCE", then control is given to step **2915**; if it is found equal to "ELEMENT", then control is given to step **2914**.

- At step **2914**, the currently selected range of cells *STISM_range* is reshaped so that it first occupies all the columns of the scalable template instance *STISM_instance_range* and second does not occupy any row outside the

intersection of the body part of the scalable template instance *STISM_instance_range* with the previous position of the selected range of cells. Then the currently selected cell becomes the top left cell of this reshaped currently selected range of cells. Then control is given to step **2917**.

- At step **2915**, the currently selected range of cells is reshaped so that it occupies the same rows and columns as the body part of the scalable template instance *STISM_instance_range*. Then control is given to step **2917**.

- At step **2916**, the STIT table **750** is scanned to remove from it any record **751** corresponding to a corrupted scalable template instance, as found at step **2907**. Each time such a record **751** has been removed from the STIT table **750**, the "Reference Housekeeping Process", as described in step **1414** of the ***Scalable Template Instanciator*** method, is invoked and executed before looking for any other record **751** to be removed from the STIT table **750**.

- At step **2917**, the conventional user-interface means are used to retrieve from the spreadsheet user the conventional options and parameters characterising the sorting application. Such means can typically correspond to the display of a dedicated dialog box on the display device **106**, but any other similar means could be used instead without departing from the spirit of the present invention.

- At step **2918**, the sorting operation is performed according to the conventional means on the range of cells which may have been reshaped during previous steps **2914** or **2915**. Then control is given to step **2912**.

ALTERNATE EMBODIMENTS

The methods and systems according to the present invention may be used advantageously in those environments where elements of information are organised as vertically structured two dimensions tables.

The methods and systems according to the present invention may be used advantageously in those environments where elements of information are organised as multidimensional tables having more than two dimensions.

While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood that various changes in form and detail may be made therein without departing from the spirit, and scope of the invention.

Claims

What is claimed is:

1. A method for exporting-importing the content of input cells from a source scalable template instance in a source multi-dimensional spreadsheet to a destination scalable template instance in a destination multi-dimensional spreadsheet; a multi-dimensional spreadsheet comprising a plurality of cells identified by a cell address along each dimension; a scalable template instance comprising a variable number of contiguous elements of same size ordered and aligned along a given spreadsheet dimension and structured according to information defined in an associated scalable template; an element being defined as a range of cells; a range of cells comprising one or a plurality of cells; said scalable template comprising an element profile; an element profile defining a cell content and a cell destination for each cell within each element; said cell destination specifying whether the cell is an input cell for receiving an entry or an output cell for producing a result; said method comprising the steps of:

- Detecting a command for exporting-importing input cells from a source scalable template instance in a source spreadsheet to a destination scalable template instance in a destination spreadsheet;
- Identifying the source scalable template associated with the source scalable template instance;
- Identifying cells, if there are any, defined as input cells in the element profile of the source scalable template;
- Identifying the destination scalable template associated with the destination scalable template instance;
- Identifying cells, if there are any, defined as input cells in the element profile of the destination scalable template;
- Copying cell per cell, the content of each input cell of the source scalable template instance in each input cell of the destination scalable template instance.

2. The method according to the preceding claim wherein the content of each input cell of the source scalable template instance is copied within each input cell of the destination scalable template instance input cell per input cell starting with the first input cell of the first element of both source and destination scalable template instance.

3. The method according to any one of the preceding claims wherein the source spreadsheet and the destination spreadsheet are the same spreadsheet.

4. The method according to any one of the preceding claims wherein the step of copying cell per cell, the content of each input cell of the source scalable template instance in each input cell of the destination scalable template instance, comprises the further steps of:

- Determining whether the number of elements in the source scalable template instance is greater than the number of elements in the destination scalable template instance or not;

If the number of elements in the source scalable template instance is greater than the number of elements in the destination scalable template instance:

- Selecting in the source scalable template, a number of elements equal to the number of elements of the destination scalable template instance;
- Copying cell per cell, the content of each input cell of each selected element of the source scalable template instance, in each input cell of each element of the destination scalable template instance.

5. The method according to any one of the preceding claims wherein the step of selecting in the source scalable template, a number of elements equal to the number of elements of the destination scalable template instance, comprises the step of:

- selecting the elements in the source scalable template instance by starting with the first element.

6. The method according to any one of the preceding claims wherein the step of copying cell per cell, the content of each input cell of the source scalable template instance in each input cell of the destination scalable template instance, comprises the further steps of:

- Determining whether the number of input cells in each element of the source scalable template instance is greater than the number of input cells in each element of the destination scalable template instance or not;

If the number of input cells in each element of the source scalable template instance is greater than the number of input cells in each element of the destination scalable template instance:

- Selecting in each element of the source scalable template, a number of input cells equal to the number of input cells in each element of the destination scalable template instance;
- Copying cell per cell, the content of each selected input cell of each element of the source scalable template instance, in each input cell of each element of the destination scalable template instance.

7. The method according to any one of the preceding claims wherein the step of selecting in the source scalable template, a number of input cells in each element equal to the number of input cells in each element of the destination scalable template instance, comprises the step of:

- selecting the input cells in each element of the source scalable template instance by starting with the first input cell in each element.

8. The method according to any one of the preceding claims wherein the step of copying cell per cell, the content of each input cell of the source scalable template

instance in each input cell of the destination scalable template instance, comprises the further steps of:

- Storing the content of input cells of the source scalable template in a temporary file.

9. The method according to any one of the preceding claims wherein an element profile defines for each cell of an element:

- A formula, said formula referring to one or a plurality of cells; or
- A default value.

10. The method according to any one of the previous claims wherein each element profile comprises:

- a profile illustrative range of cells;
- for each cell belonging to said profile illustrative range of cells, a cell content and a cell destination.

11. The method according to any one of the preceding claims wherein a scalable template further comprises an element format; an element format defining for each cell within an element, one or a plurality of format attributes.

12. The method according to any one of the preceding claims wherein an element format defines for each cell of an element one or a plurality of :

- Background attributes; and/or
- Alignment attributes; and/or
- Font attributes; and/or
- Line attributes; and/or
- Protection attributes.

13. The method according to any one of the previous claims wherein each element format comprises:

- a format illustrative range of cells;
- for each cell belonging to said format illustrative range of cells, one or a plurality of format attributes.

14. A system comprising means adapted for carrying out the steps of the method according to any one of the preceding claims.

15. A computer program comprising instructions for carrying out the steps of the method according to any one of claims 1 to 13, when said computer program is executed.

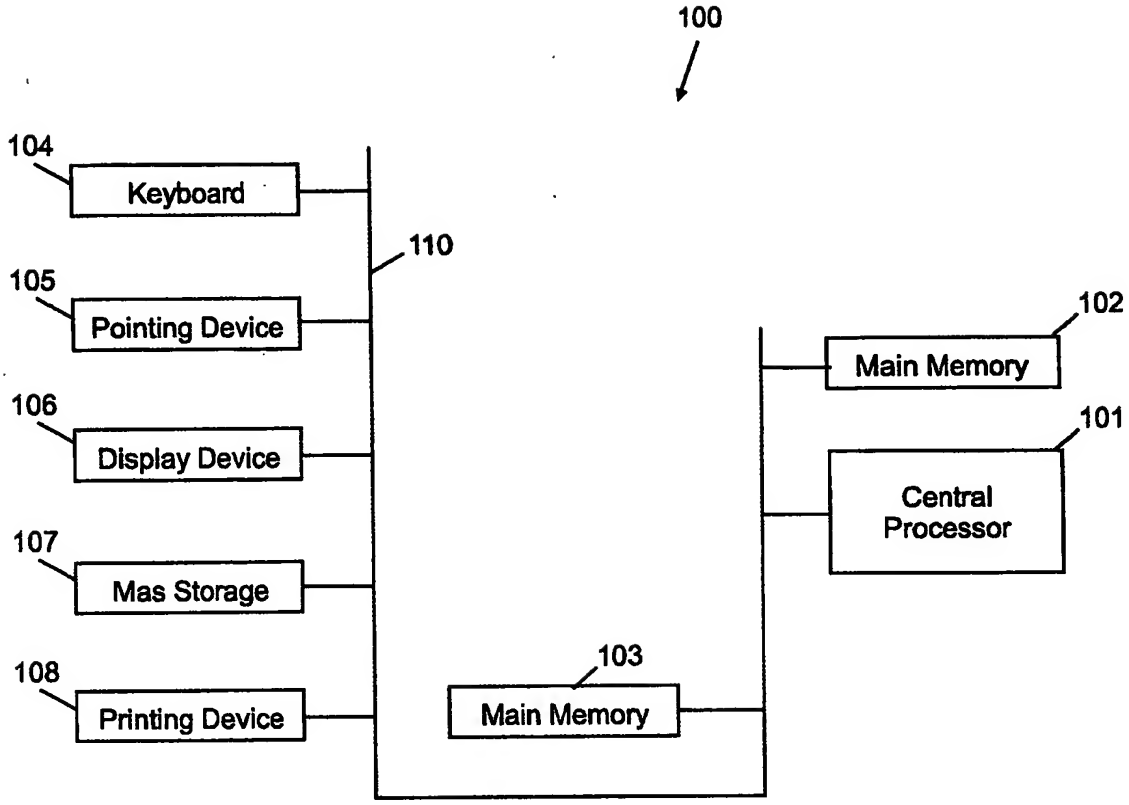

100
104
Keyboard
110
105
Pointing Device
102
Main Memory
106
Display Device
101
Central Processor
107
Mas Storage
103
108
Printing Device
Main Memory

FIG. 1A

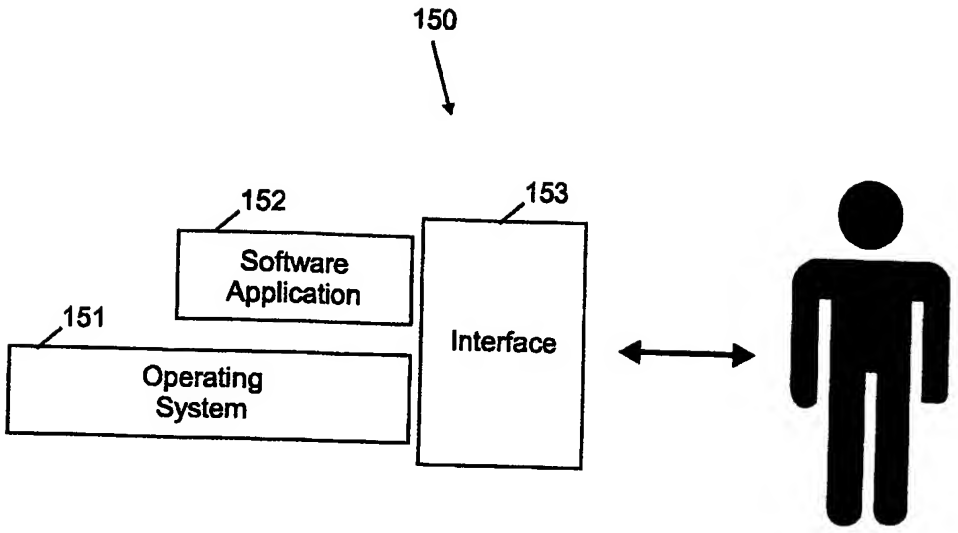

150
152
153
Software Application
151
Operating System
Interface

FIG. 1B

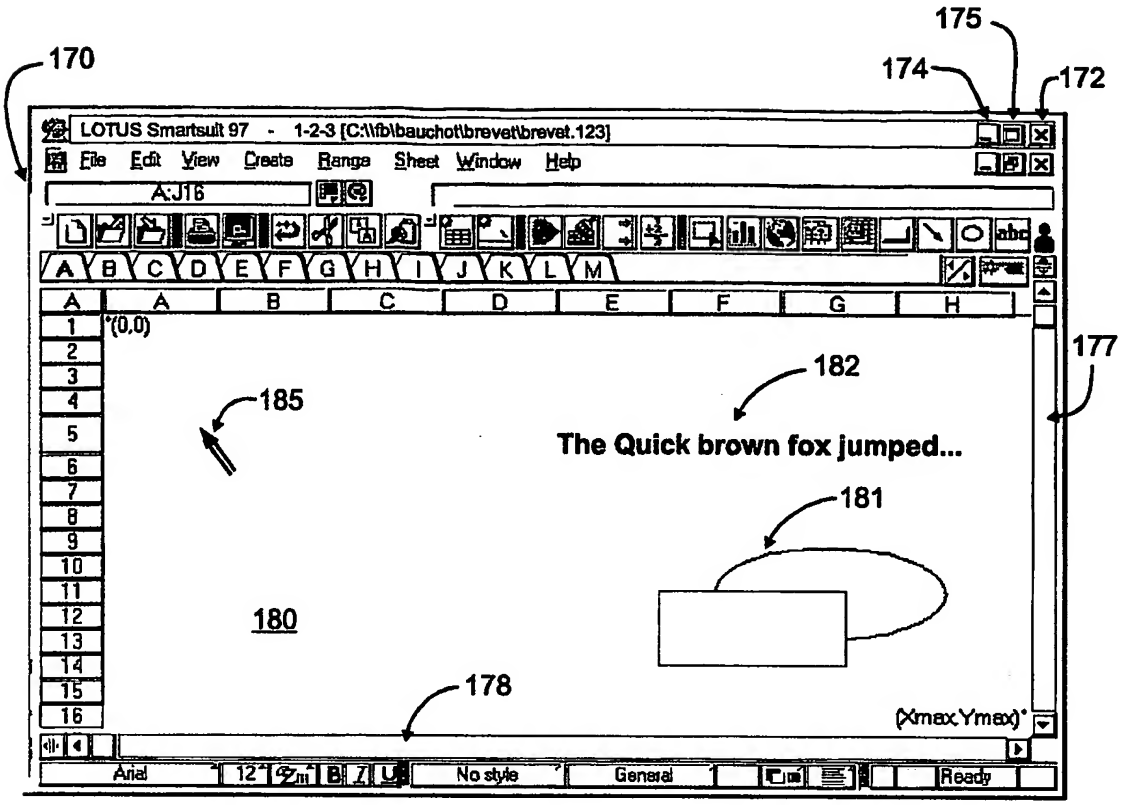
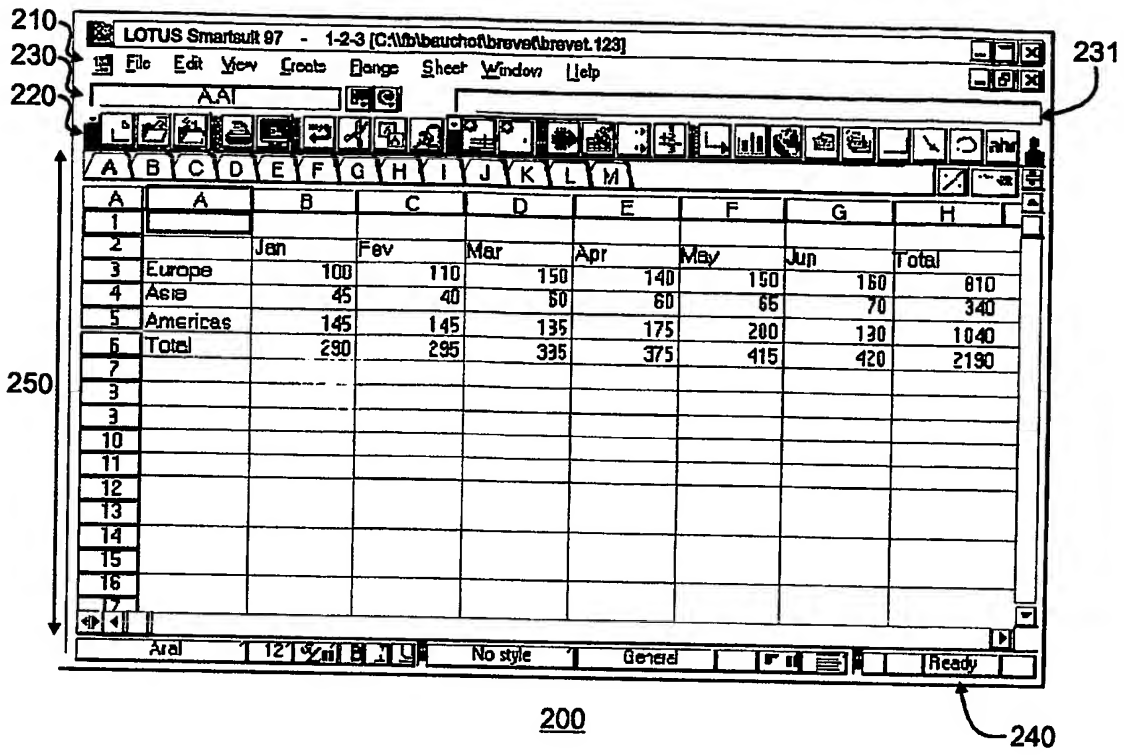

175
170
174
172
LOTUS Smartsuit 97 - 1-2-3 [C:\\fb\bauchot\brevet\brevet.123]
File Edit View Create Range Sheet Window Help
A:J16
A B C D E F G H I J K L M
A A B C D E F G H
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
(0,0)
177
182
185
The Quick brown fox jumped...
181
180
178
(Xmax,Ymax)
Arial 12 No style General Ready

FIG. 1C



	A	B	C	D	E	F	G	H
1								
2		Jan	Fev	Mar	Apr	May	Jun	Total
3	Europe	100	110	150	140	150	160	810
4	Asia	45	40	50	60	65	70	340
5	Americas	145	145	135	175	200	130	1040
6	Total	290	295	335	375	415	420	2190
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

FIG. 2A

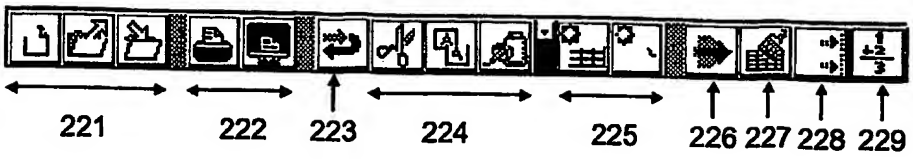


FIG. 2B

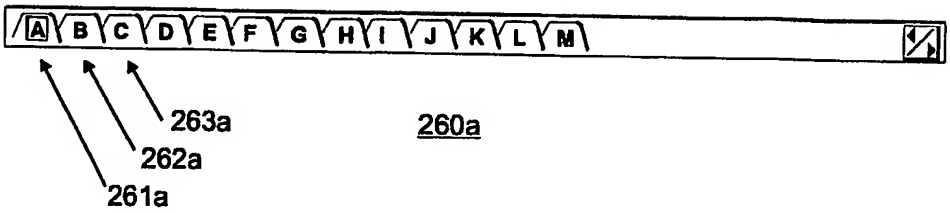


FIG. 2C

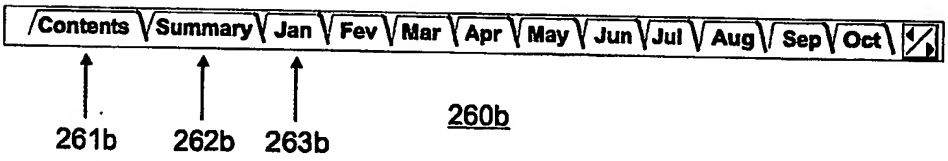


FIG. 2D

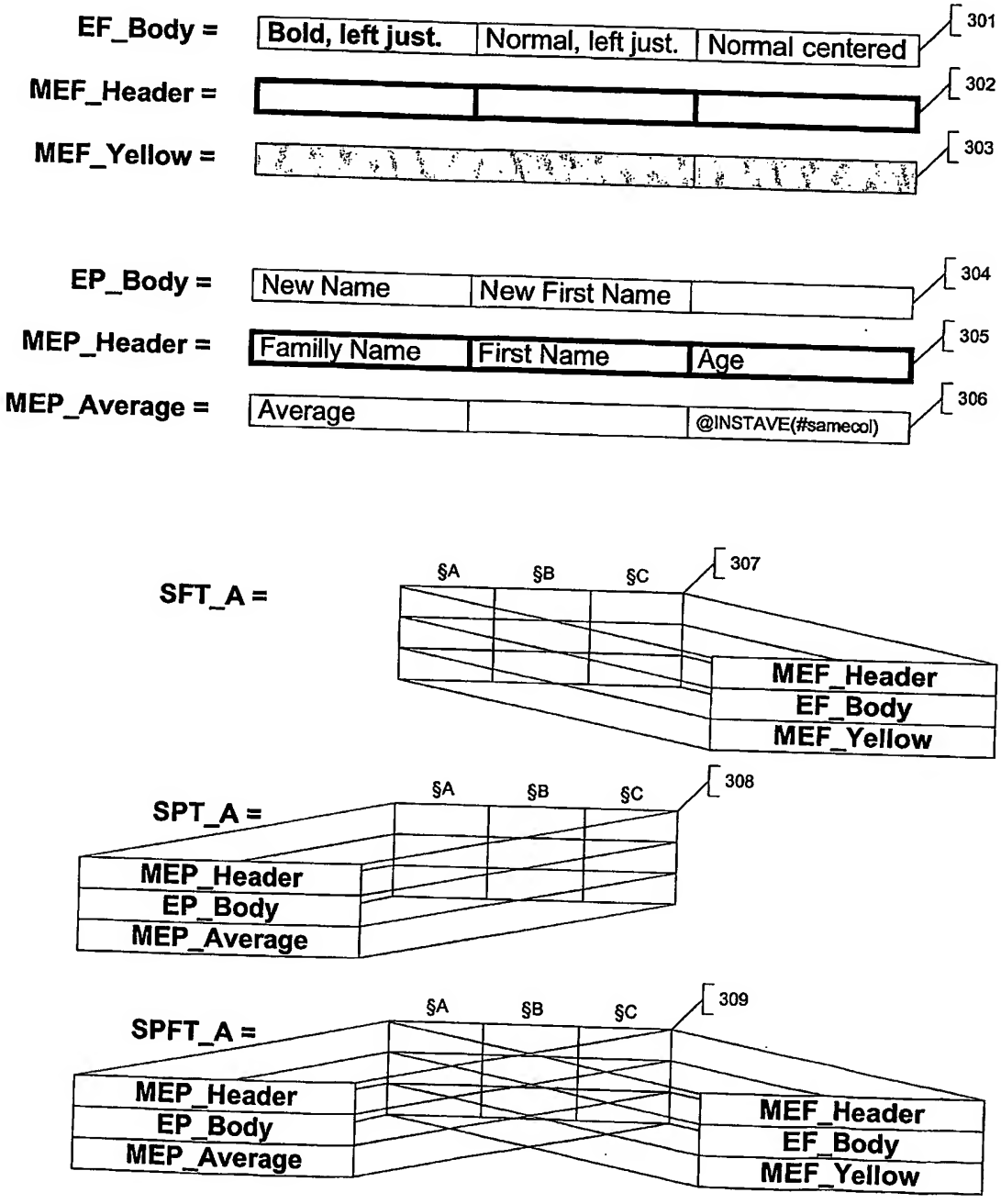

EF_Body =
Bold, left just.
Normal, left just.
Normal centered
301
MEF_Header =
302
MEF_Yellow =
303
EP_Body =
New Name
New First Name
304
MEP_Header =
Familly Name
First Name
Age
305
MEP_Average =
Average
@INSTAVE(#samecol)
306
SFT_A =
§A
§B
§C
307
MEF_Header
EF_Body
MEF_Yellow
SPT_A =
§A
§B
§C
308
MEP_Header
EP_Body
MEP_Average
SPFT_A =
§A
§B
§C
309
MEP_Header
EP_Body
MEP_Average
MEF_Header
EF_Body
MEF_Yellow

Fig. 3

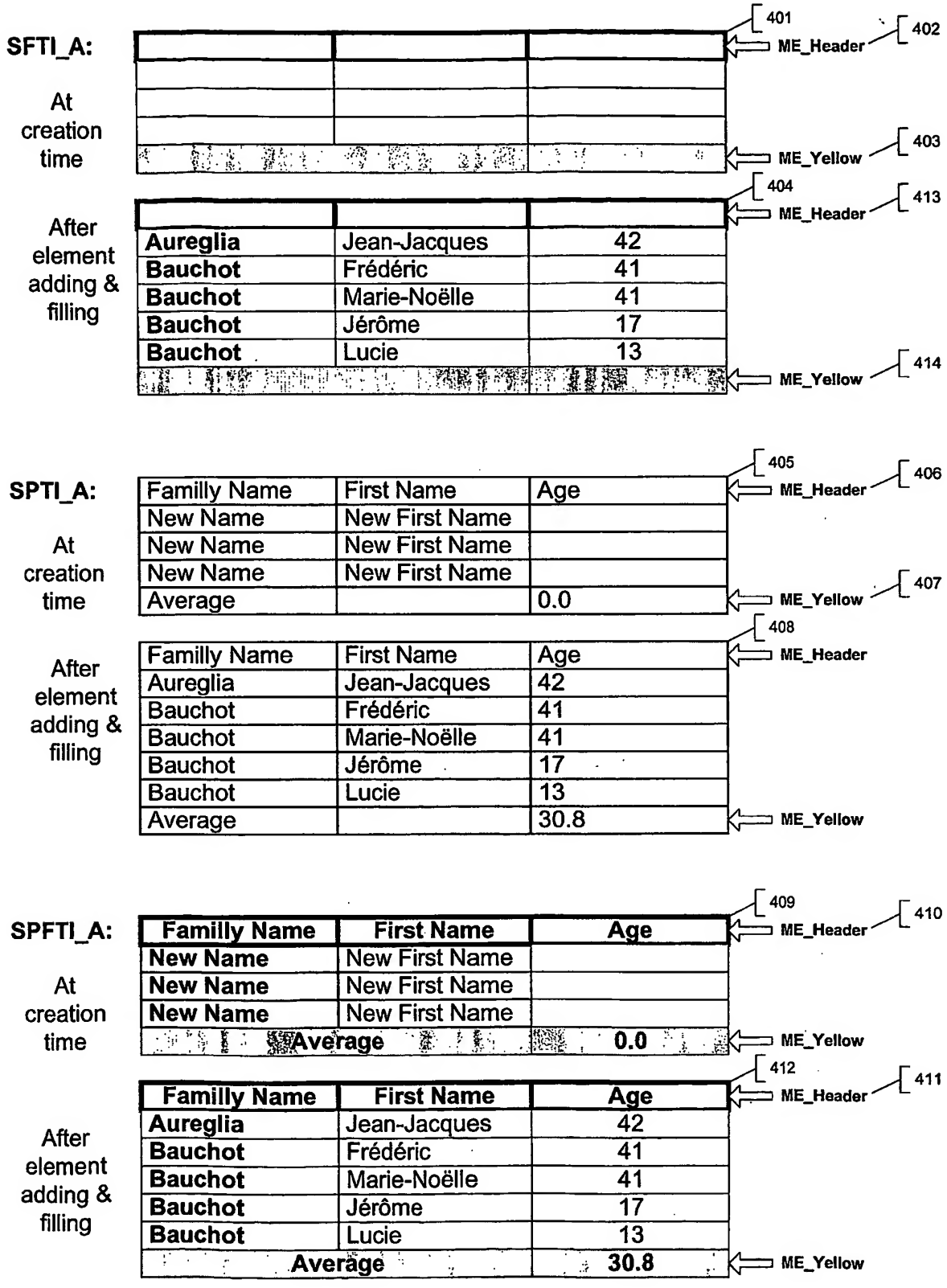

SFTI_A:
At creation time
After element adding & filling
401
402
ME_Header
403
ME_Yellow
404
413
ME_Header
Aureglia Jean-Jacques 42
Bauchot Frédéric 41
Bauchot Marie-Noëlle 41
Bauchot Jérôme 17
Bauchot Lucie 13
414
ME_Yellow
SPTI_A:
At creation time
After element adding & filling
405
406
ME_Header
Familly Name First Name Age
New Name New First Name
New Name New First Name
New Name New First Name
Average 0.0
407
ME_Yellow
408
ME_Header
Familly Name First Name Age
Aureglia Jean-Jacques 42
Bauchot Frédéric 41
Bauchot Marie-Noëlle 41
Bauchot Jérôme 17
Bauchot Lucie 13
Average 30.8
ME_Yellow
SPFTI_A:
At creation time
After element adding & filling
409
410
ME_Header
Familly Name First Name Age
New Name New First Name
New Name New First Name
New Name New First Name
Average 0.0
ME_Yellow
412
411
ME_Header
Familly Name First Name Age
Aureglia Jean-Jacques 42
Bauchot Frédéric 41
Bauchot Marie-Noëlle 41
Bauchot Jérôme 17
Bauchot Lucie 13
Average 30.8
ME_Yellow

Fig. 4

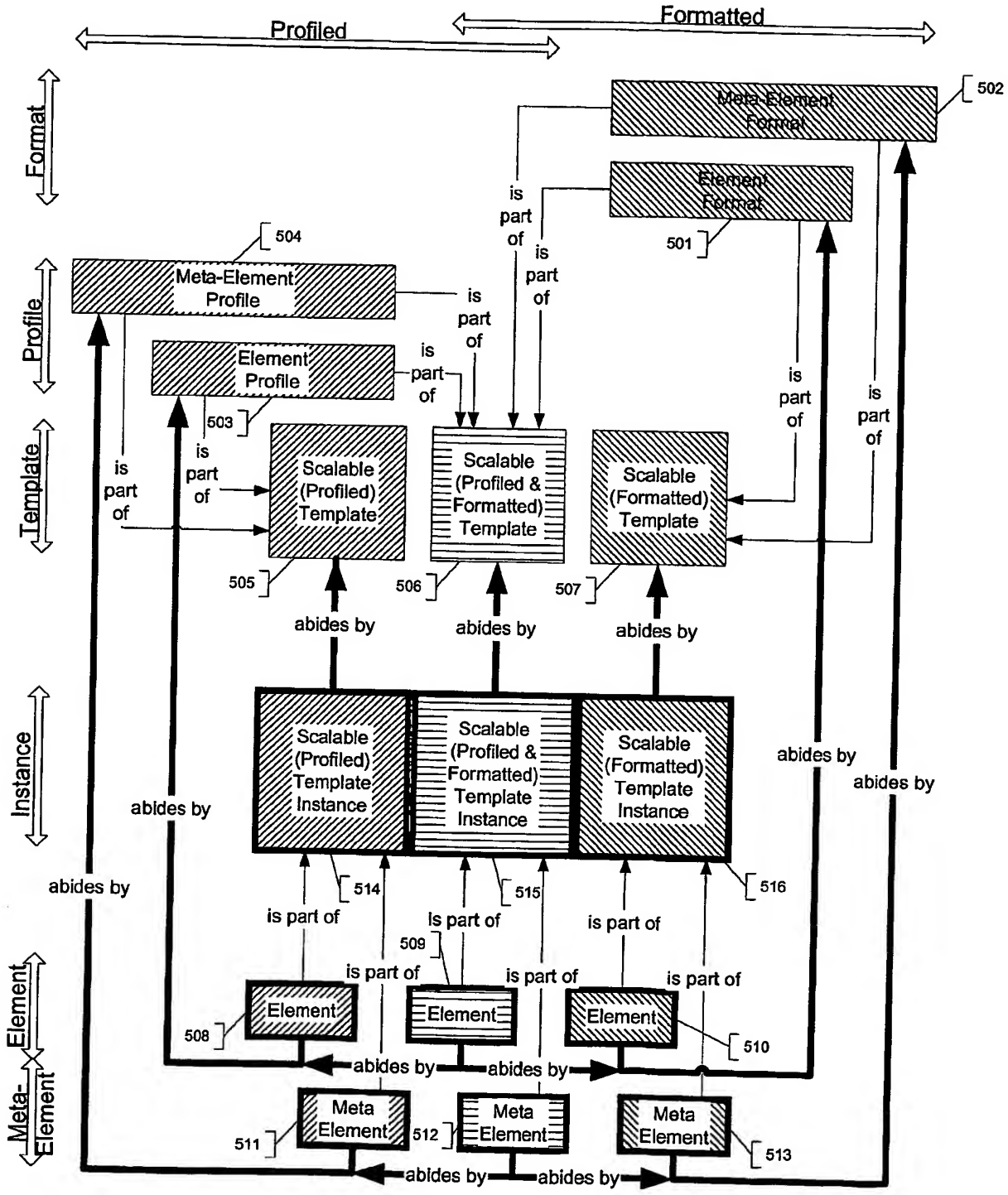

Profiled
Formatted
Format
Profile
Template
Instance
Element
Meta-Element
Meta-Element Format
Element Format
Meta-Element Profile
Element Profile
Scalable (Profiled) Template
Scalable (Profiled & Formatted) Template
Scalable (Formatted) Template
Scalable (Profiled) Template Instance
Scalable (Profiled & Formatted) Template Instance
Scalable (Formatted) Template Instance
Element
Element
Element
Meta Element
Meta Element
Meta Element
502
501
504
503
505
506
507
508
509
510
511
512
513
514
515
516
is part of
abides by

Fig. 5

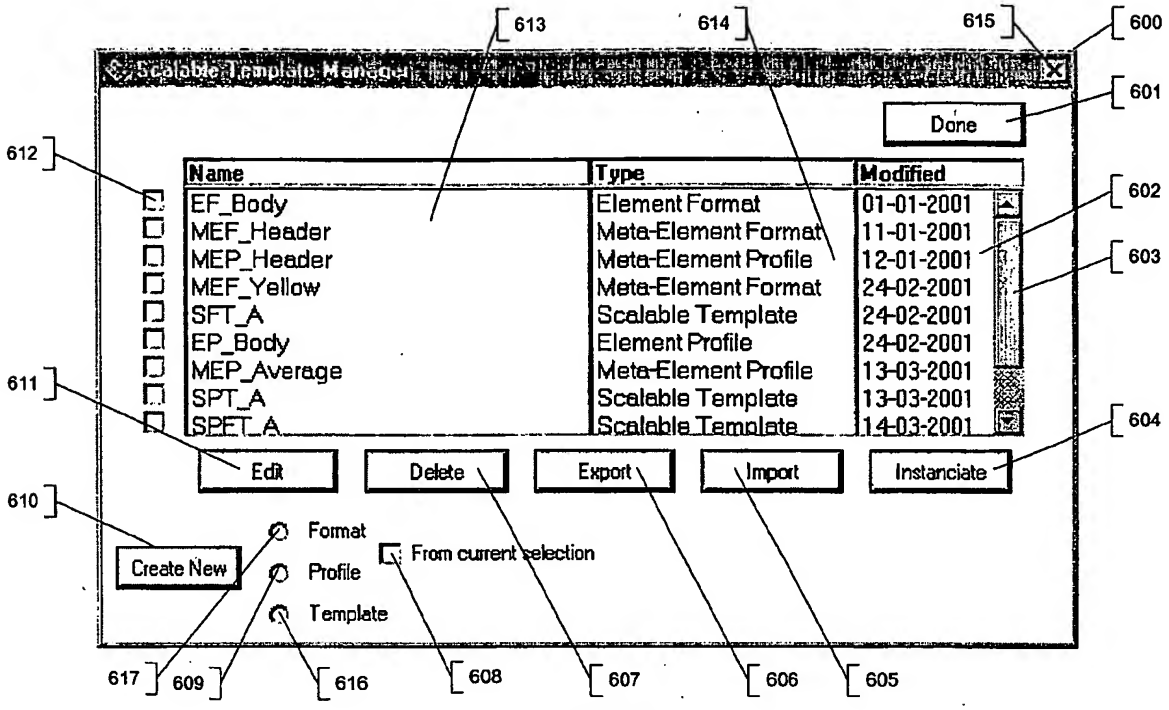

Scalable Template Manager
Done
Name
Type
Modified
EF_Body
Element Format
01-01-2001
MEF_Header
Meta-Element Format
11-01-2001
MEP_Header
Meta-Element Profile
12-01-2001
MEF_Yellow
Meta-Element Format
24-02-2001
SFT_A
Scalable Template
24-02-2001
EP_Body
Element Profile
24-02-2001
MEP_Average
Meta-Element Profile
13-03-2001
SPT_A
Scalable Template
13-03-2001
SPET_A
Scalable Template
14-03-2001
Edit
Delete
Export
Import
Instanciate
Create New
Format
Profile
Template
From current selection
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617

Fig. 6A

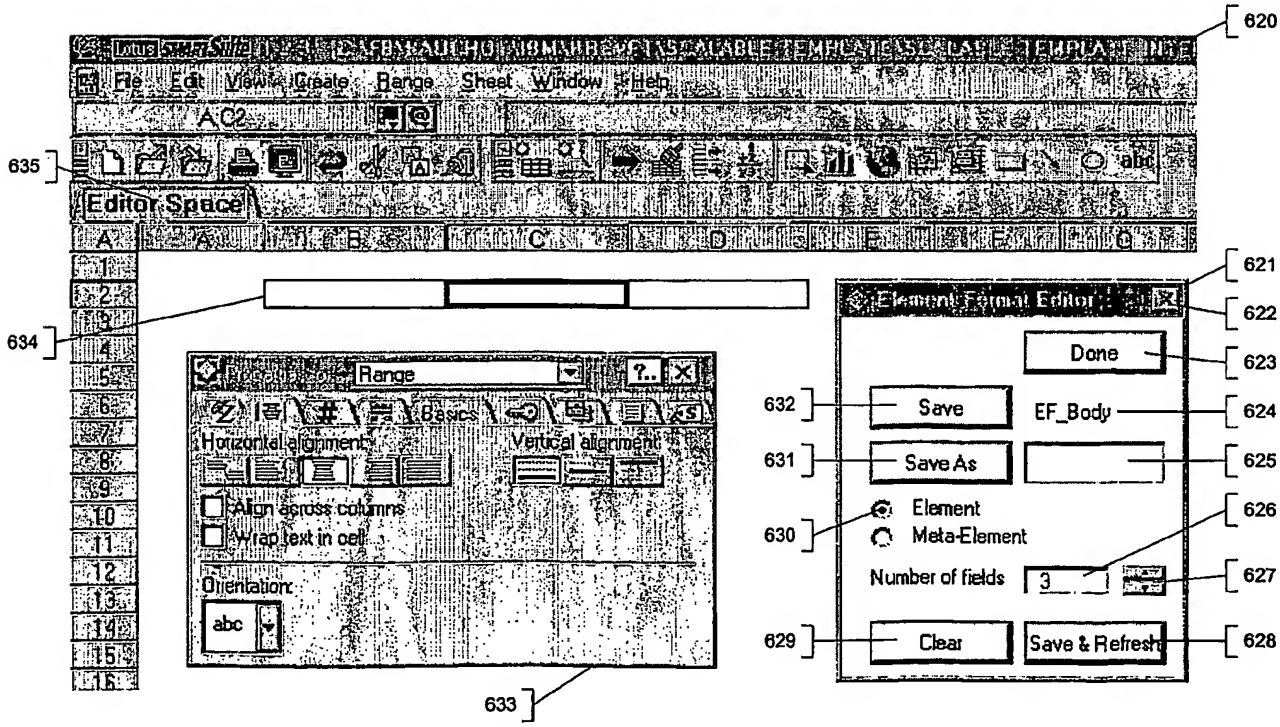

File Edit View Create Range Sheet Window Help
Editor Space
Range
Basics
Horizontal alignment
Vertical alignment
Align across columns
Wrap text in cell
Orientation
abc
Element Format Editor
Done
Save
EF_Body
Save As
Element
Meta-Element
Number of fields
3
Clear
Save & Refresh
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635

Fig. 6B

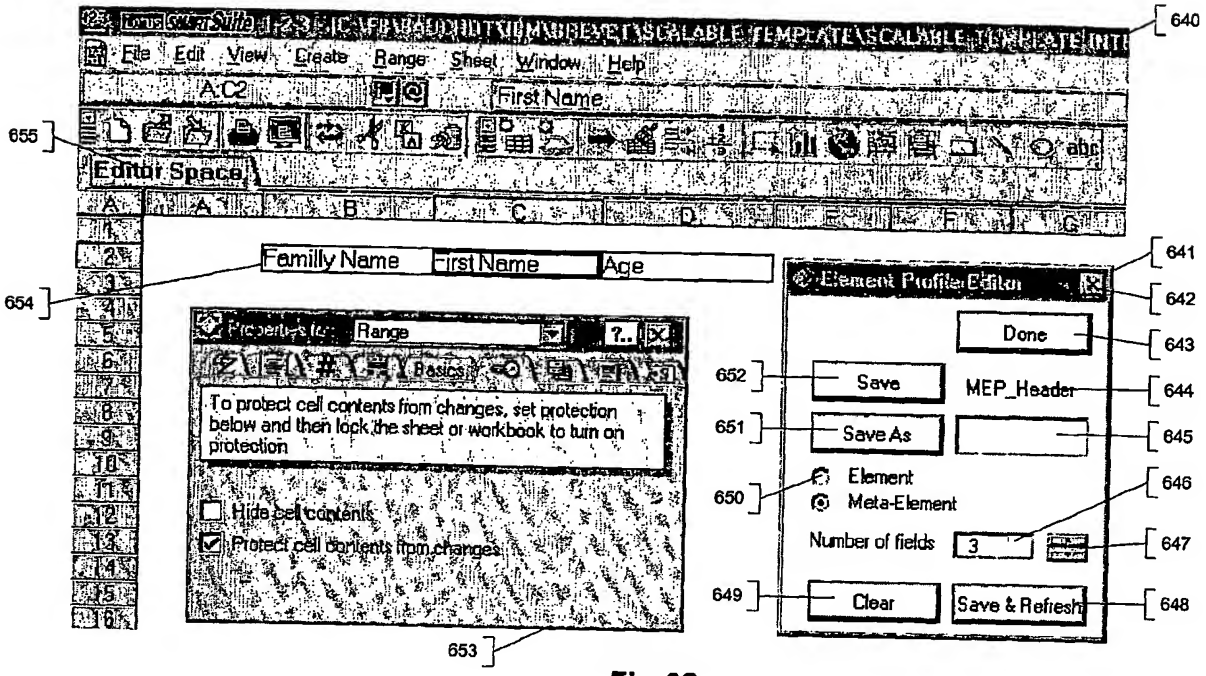

File Edit View Create Range Sheet Window Help
First Name
Editor Space
Familly Name
First Name
Age
Element Profile Editor
Done
Save
MEP_Header
Save As
Element
Meta-Element
Number of fields
3
Clear
Save & Refresh
Range
To protect cell contents from changes, set protection below and then lock the sheet or workbook to turn on protection
Hide cell contents
Protect cell contents from changes
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655

Fig. 6C

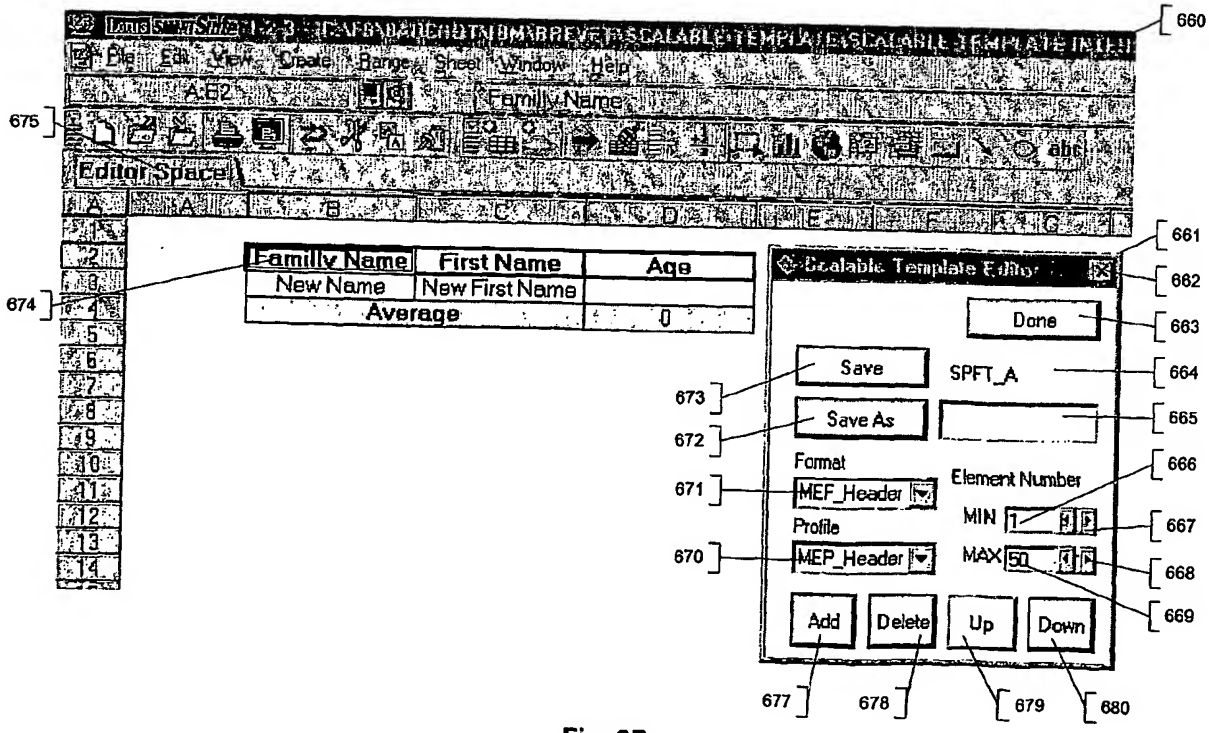

File Edit View Create Range Sheet Window Help
Family Name
Editor Space
Familly Name
First Name
Age
New Name
New First Name
Average
0
Scalable Template Editor
Done
Save
SPFT_A
Save As
Format
MEF_Header
Element Number
MIN
Profile
MEP_Header
MAX
Add
Delete
Up
Down
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
677
678
679
680

Fig. 6D

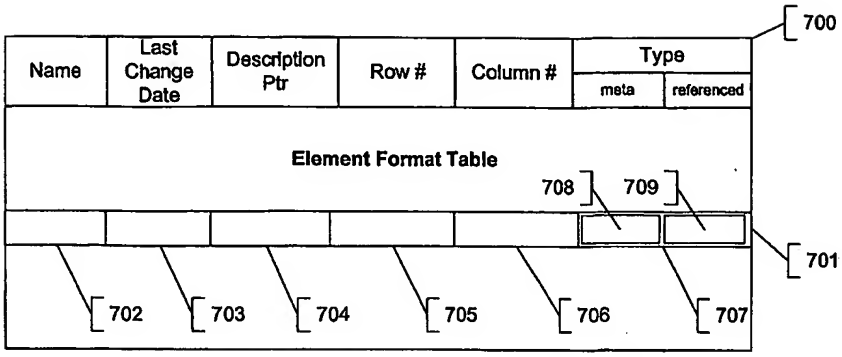


Fig. 7A

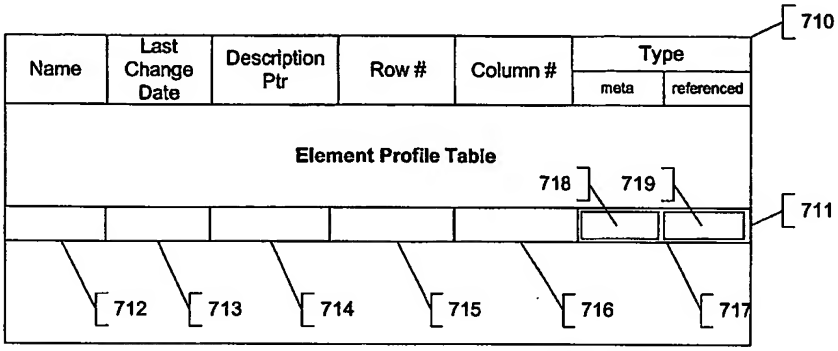


Fig. 7B

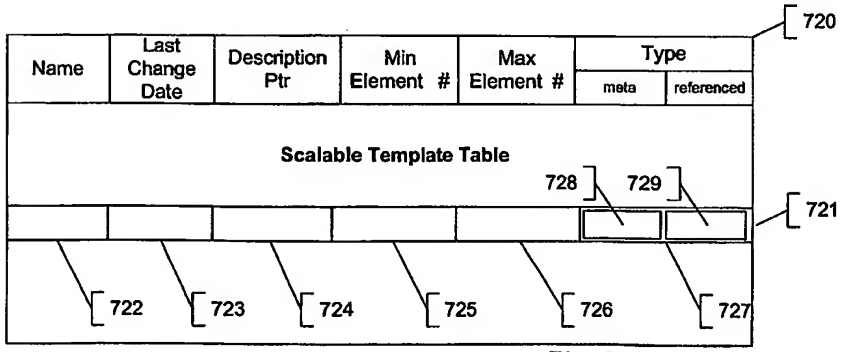


Fig. 7C

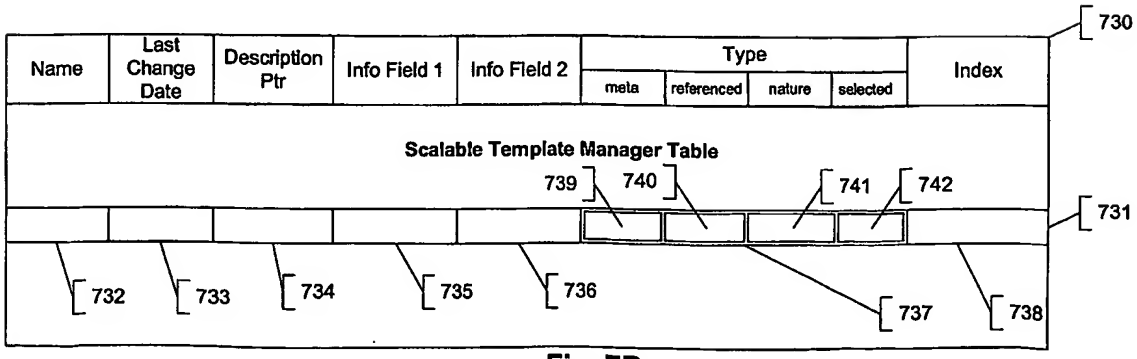


Fig. 7D

Fig. 7E

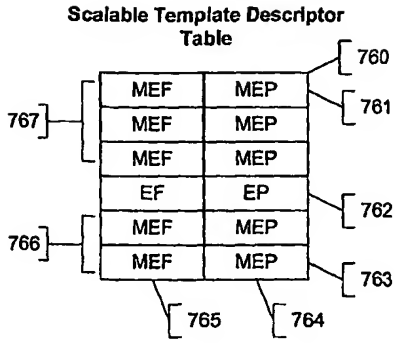


Fig. 7F

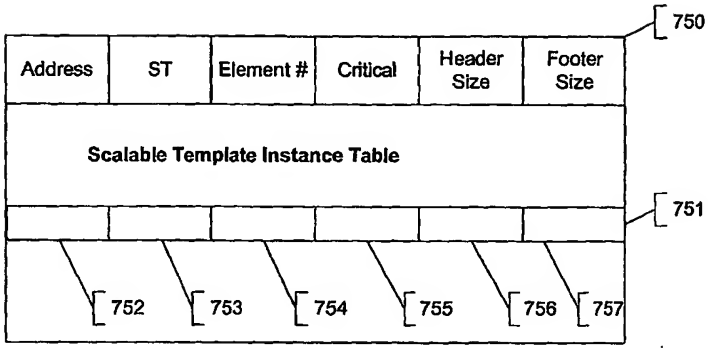


Fig. 7G

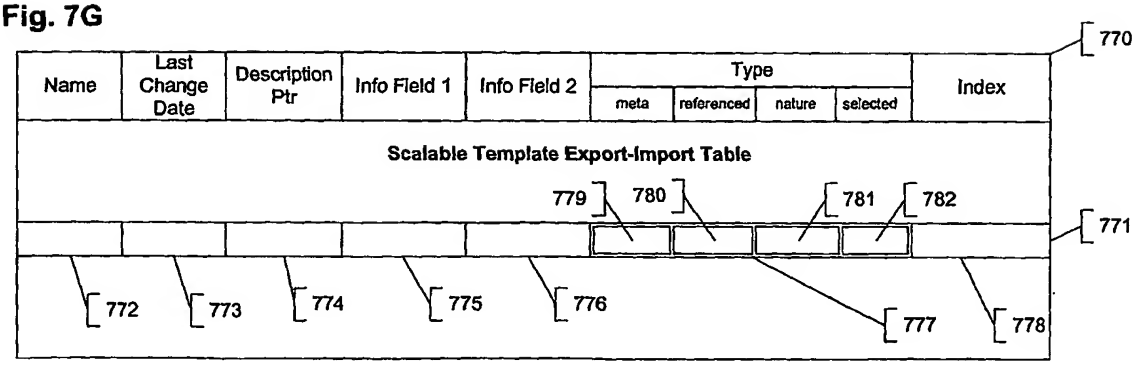
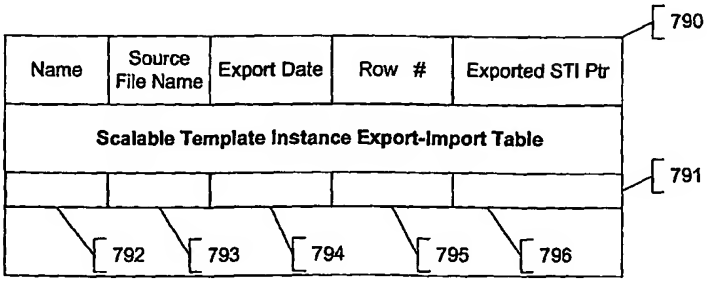


Fig. 7H



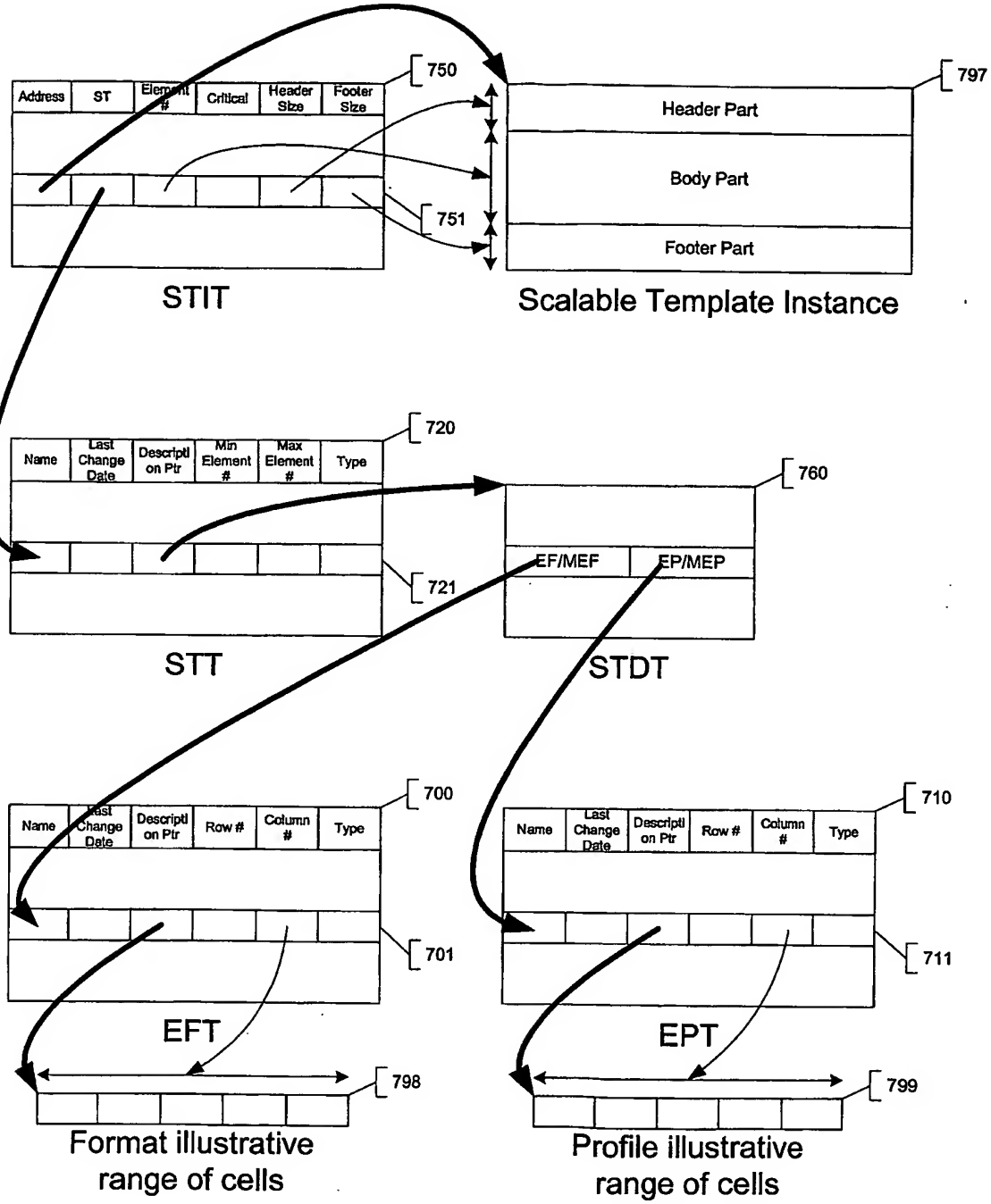

Address
ST
Element #
Critical
Header Size
Footer Size
750
751
STIT
797
Header Part
Body Part
Footer Part
Scalable Template Instance
Name
Last Change Date
Descriptl on Ptr
Min Element #
Max Element #
Type
720
721
STT
760
EF/MEF
EP/MEP
STDT
Name
Last Change Date
Descriptl on Ptr
Row #
Column #
Type
700
701
EFT
710
711
EPT
798
799
Format illustrative range of cells
Profile illustrative range of cells

Fig. 7I

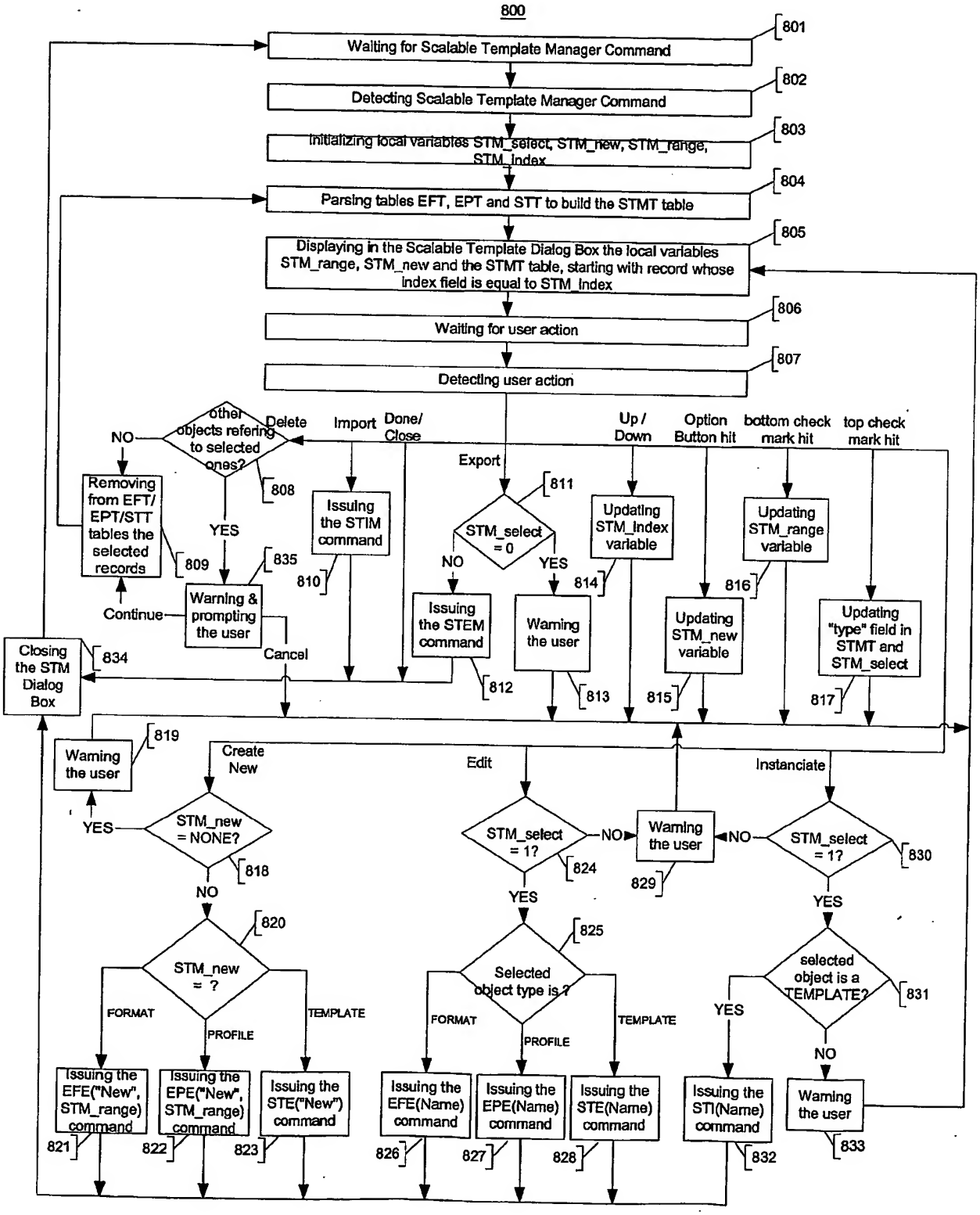

800
Waiting for Scalable Template Manager Command
801
Detecting Scalable Template Manager Command
802
Initializing local variables STM_select, STM_new, STM_range, STM_index
803
Parsing tables EFT, EPT and STT to build the STMT table
804
Displaying in the Scalable Template Dialog Box the local variables STM_range, STM_new and the STMT table, starting with record whose index field is equal to STM_index
805
Waiting for user action
806
Detecting user action
807
other objects refering to selected ones?
NO
YES
808
Delete
Import
Done/ Close
Export
Up / Down
Option Button hit
bottom check mark hit
top check mark hit
Removing from EFT/ EPT/STT tables the selected records
809
Continue
Issuing the STIM command
810
Warning & prompting the user
835
Cancel
STM_select = 0
811
NO
YES
Issuing the STEM command
812
Warning the user
813
Updating STM_Index variable
814
Updating STM_range variable
816
Updating STM_new variable
815
Updating "type" field in STMT and STM_select
817
Closing the STM Dialog Box
834
Warning the user
819
Create New
Edit
Instanciate
STM_new = NONE?
YES
818
NO
STM_select = 1?
824
NO
YES
Warning the user
829
STM_select = 1?
830
NO
YES
820
STM_new = ?
FORMAT
PROFILE
TEMPLATE
Selected object type is ?
825
FORMAT
PROFILE
TEMPLATE
selected object is a TEMPLATE?
831
YES
NO
Issuing the EFE("New", STM_range) command
821
Issuing the EPE("New", STM_range) command
822
Issuing the STE("New") command
823
Issuing the EFE(Name) command
826
Issuing the EPE(Name) command
827
Issuing the STE(Name) command
828
Issuing the STI(Name) command
832
Warning the user
833

Fig. 8

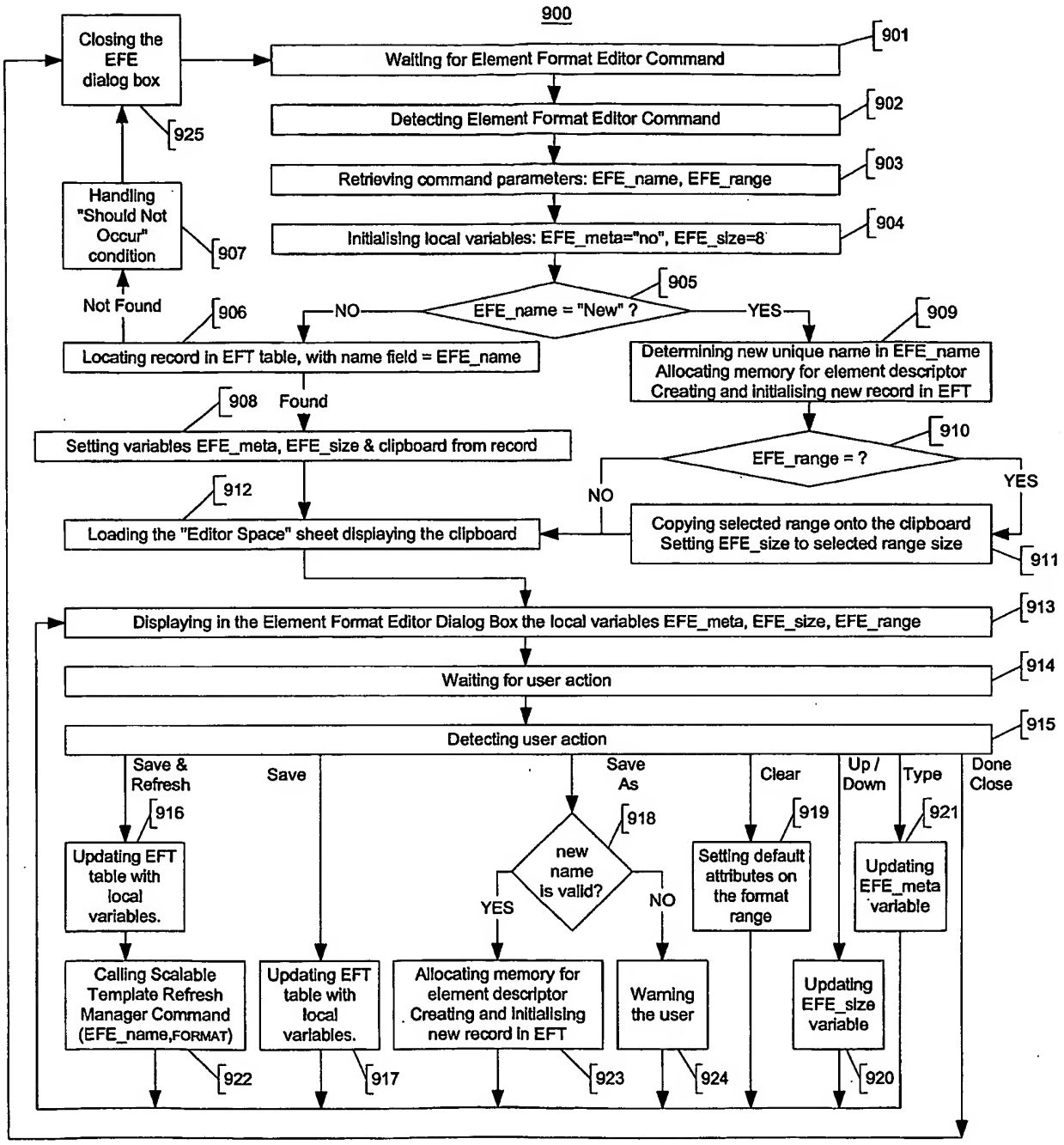

900
Closing the EFE dialog box
Waiting for Element Format Editor Command
901
Detecting Element Format Editor Command
902
Retrieving command parameters: EFE_name, EFE_range
903
Initialising local variables: EFE_meta="no", EFE_size=8
904
925
Handling "Should Not Occur" condition
907
EFE_name = "New" ?
905
NO
YES
Not Found
906
Locating record in EFT table, with name field = EFE_name
909
Determining new unique name in EFE_name
Allocating memory for element descriptor
Creating and initialising new record in EFT
908
Found
Setting variables EFE_meta, EFE_size & clipboard from record
910
EFE_range = ?
NO
YES
912
Loading the "Editor Space" sheet displaying the clipboard
Copying selected range onto the clipboard
Setting EFE_size to selected range size
911
913
Displaying in the Element Format Editor Dialog Box the local variables EFE_meta, EFE_size, EFE_range
914
Waiting for user action
915
Detecting user action
Save & Refresh
Save
Save As
Clear
Up / Down
Type
Done Close
916
Updating EFT table with local variables.
Calling Scalable Template Refresh Manager Command (EFE_name,FORMAT)
922
Updating EFT table with local variables.
917
918
new name is valid?
YES
NO
Allocating memory for element descriptor
Creating and initialising new record in EFT
923
Warning the user
924
919
Setting default attributes on the format range
921
Updating EFE_meta variable
Updating EFE_size variable
920

Fig. 9

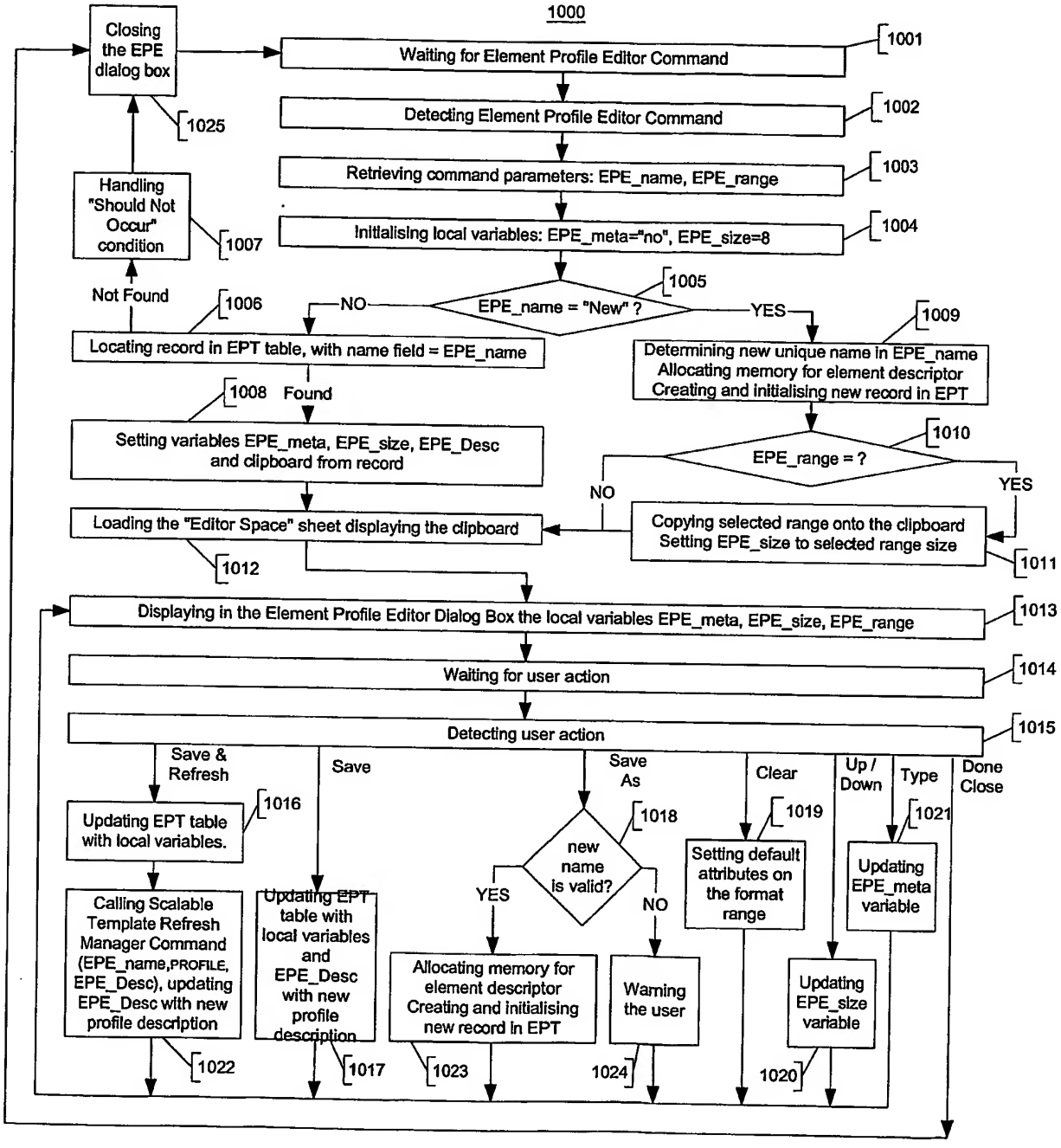

1000
Closing the EPE dialog box
1025
Waiting for Element Profile Editor Command
1001
Detecting Element Profile Editor Command
1002
Retrieving command parameters: EPE_name, EPE_range
1003
Initialising local variables: EPE_meta="no", EPE_size=8
1004
Handling "Should Not Occur" condition
1007
Not Found
1006
EPE_name = "New" ?
1005
NO
YES
Locating record in EPT table, with name field = EPE_name
Found
1008
Determining new unique name in EPE_name
Allocating memory for element descriptor
Creating and initialising new record in EPT
1009
Setting variables EPE_meta, EPE_size, EPE_Desc and clipboard from record
EPE_range = ?
1010
NO
YES
Loading the "Editor Space" sheet displaying the clipboard
1012
Copying selected range onto the clipboard
Setting EPE_size to selected range size
1011
Displaying in the Element Profile Editor Dialog Box the local variables EPE_meta, EPE_size, EPE_range
1013
Waiting for user action
1014
Detecting user action
1015
Save & Refresh
Save
Save As
Clear
Up / Down
Type
Done Close
Updating EPT table with local variables.
1016
Calling Scalable Template Refresh Manager Command (EPE_name,PROFILE, EPE_Desc), updating EPE_Desc with new profile description
1022
Updating EPT table with local variables and EPE_Desc with new profile description
1017
new name is valid?
1018
YES
NO
Allocating memory for element descriptor Creating and initialising new record in EPT
1023
Warning the user
1024
Setting default attributes on the format range
1019
1020
Updating EPE_size variable
Updating EPE_meta variable
1021

Fig. 10

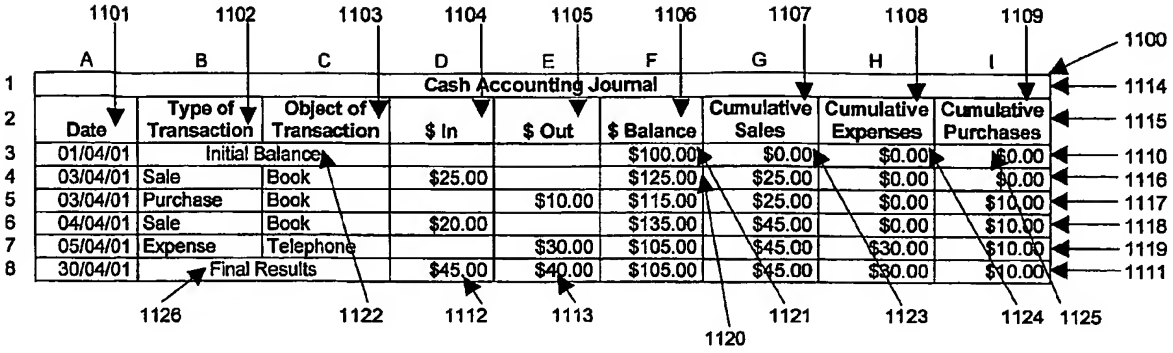


FIG 11A

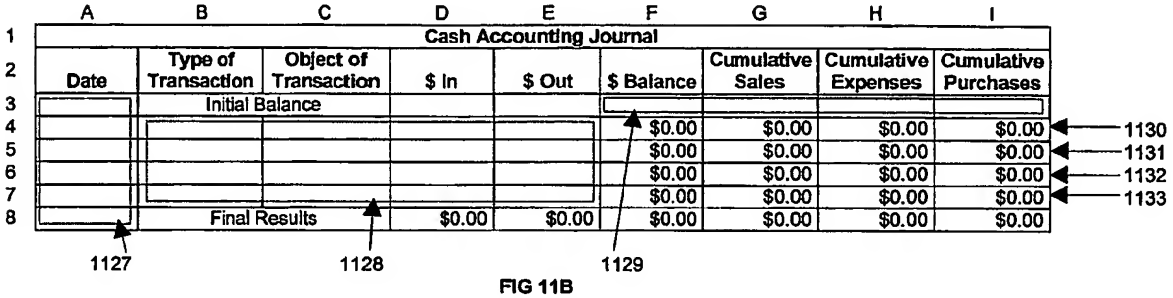


FIG 11B

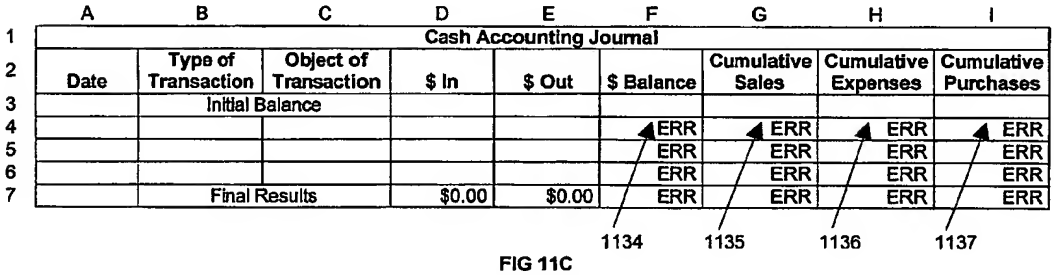


FIG 11C

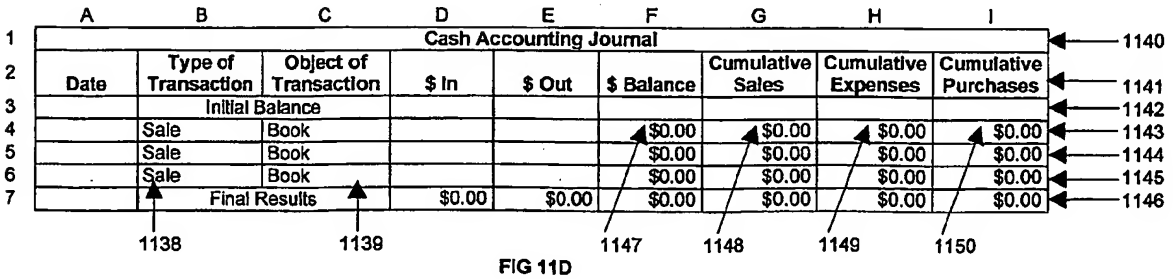


FIG 11D

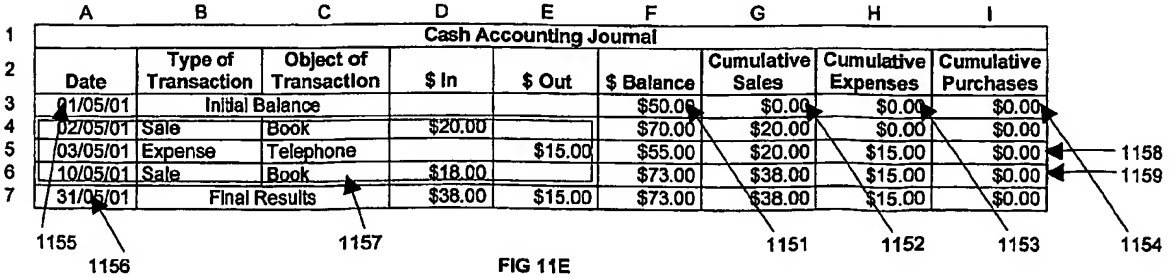


FIG 11E

	A	B	C	D	E	F	G	H	I
1	Cash Accounting Journal								
2	Date	Type of Transaction	Object of Transaction	$ In	$ Out	$ Balance	Cumulative Sales	Cumulative Expenses	Cumulative Purchases
3	01/05/01	Initial Balance				$50.00	$0.00	$0.00	$0.00
4	02/05/01	Sale	Book	$20.00		$70.00	$20.00	$0.00	$0.00
5	03/05/01	Expense	Telephone		$15.00	$55.00	$20.00	$15.00	$0.00
6									
7	10/05/01	Sale	Book	$18.00		$73.00	$38.00	$15.00	$0.00
8	31/05/01	Final Results		$38.00	$15.00	$73.00	$38.00	$15.00	$0.00

1160 1161 1163 1162

FIG 11F

	A	B	C	D	E	F	G	H	I
1	Cash Accounting Journal								
2	Date	Type of Transaction	Object of Transaction	$ In	$ Out	$ Balance	Cumulative Sales	Cumulative Expenses	Cumulative Purchases
3	01/05/01	Initial Balance				$50.00	$0.00	$0.00	$0.00
4	02/05/01	Sale	Book	$20.00		$70.00	$20.00	$0.00	$0.00
5	03/05/01	Expense	Telephone		$15.00	$55.00	$20.00	$15.00	$0.00
6		Sale	Book			$55.00	$20.00	$15.00	$0.00
7	10/05/01	Sale	Book	$18.00		$73.00	$38.00	$15.00	$0.00
8	31/05/01	Final Results		$38.00	$15.00	$73.00	$38.00	$15.00	$0.00

1164 1165 1167 1166

FIG 11G

	A	B	C	D	E	F	G	H	I
1	Cash Accounting Journal								
2	Date	Type of Transaction	Object of Transaction	$ In	$ Out	$ Balance	Cumulative Sales	Cumulative Expenses	Cumulative Purchases
3	01/05/01	Initial Balance				$50.00	$0.00	$0.00	$0.00
4	02/05/01	Sale	Book	$20.00		$70.00	$20.00	$0.00	$0.00
5	03/05/01	Expense	Telephone		$15.00	$55.00	$20.00	$15.00	$0.00
6	10/05/01	Sale	Book	$18.00		ERR	ERR	ERR	ERR
7	31/05/01	Final Results		$38.00	$15.00	ERR	ERR	ERR	ERR

1168 1169

FIG 11H

Some formulas contained in the Cash Accounting Journal illustrated in FIG 11A	
Cell	Contents of cell
F4	+F3+D4-E4
G4	+G3+@IF(B4="Sale";D4;0)
H4	+H3+@IF(B4="Expense";E4;0)
I4	+I3+@IF(B4="Purchase";E4;0)
F5	+F4+D5-E5
G5	+G4+@IF(B5="Sale";D5;0)
H5	+H4+@IF(B5="Expense";E5;0)
I5	+I4+@IF(B5="Purchase";E5;0)

FIG 11I

	A	B	C	D	E	F	G	H	I
1	Cash Accounting Journal								
2	Date	Type of Transaction	Object of Transaction	$ In	$ Out	$ Balance	Cumulative Sales	Cumulative Expenses	Cumulative Purchases
3	01/05/01	Initial Balance				$50.00	$0.00	$0.00	$0.00
4	02/05/01	Sale	Book	$20.00		$70.00	$20.00	$0.00	$0.00
5	03/05/01	Expense	Telephone		$15.00	$55.00	$20.00	$15.00	$0.00
6	10/05/01	Sale	Book	$18.00		$73.00	$38.00	$15.00	$0.00
7	11/05/01	Sale	Book		$10.00	$63.00	$38.00	$15.00	$0.00
8	31/05/01	Final Results		$38.00	$25.00	$63.00	$38.00	$15.00	$0.00

1170 1173 1171 1172

FIG 11J

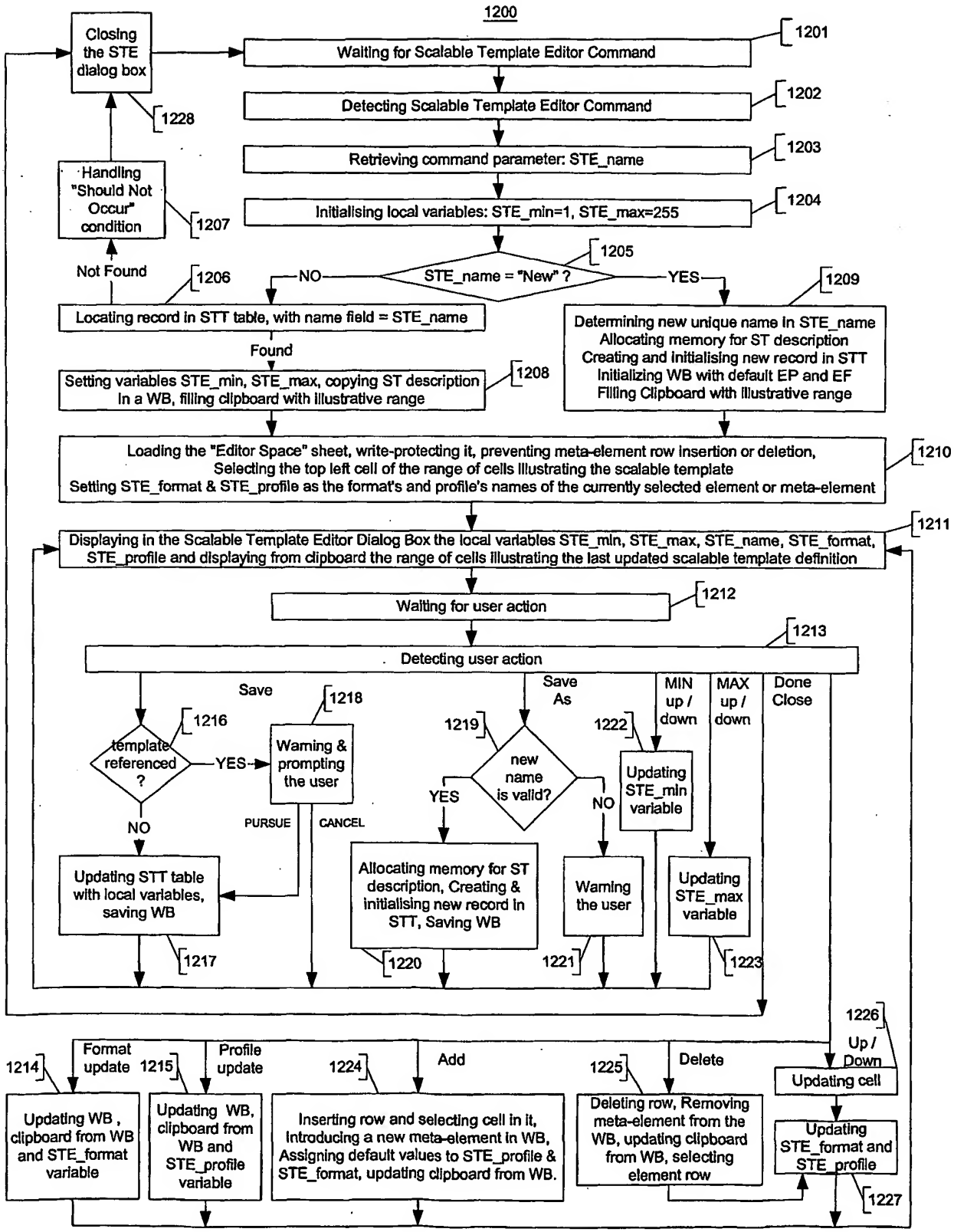

1200
Closing the STE dialog box
1228
Waiting for Scalable Template Editor Command
1201
Detecting Scalable Template Editor Command
1202
Retrieving command parameter: STE_name
1203
Initialising local variables: STE_min=1, STE_max=255
1204
Handling "Should Not Occur" condition
1207
1205
STE_name = "New" ?
NO
YES
Not Found
1206
1209
Locating record in STT table, with name field = STE_name
Found
Determining new unique name in STE_name
Allocating memory for ST description
Creating and initialising new record in STT
Initializing WB with default EP and EF
Filling Clipboard with illustrative range
Setting variables STE_min, STE_max, copying ST description In a WB, filling clipboard with illustrative range
1208
Loading the "Editor Space" sheet, write-protecting it, preventing meta-element row insertion or deletion,
Selecting the top left cell of the range of cells illustrating the scalable template
Setting STE_format & STE_profile as the format's and profile's names of the currently selected element or meta-element
1210
Displaying in the Scalable Template Editor Dialog Box the local variables STE_min, STE_max, STE_name, STE_format, STE_profile and displaying from clipboard the range of cells illustrating the last updated scalable template definition
1211
Waiting for user action
1212
Detecting user action
1213
Save
Save As
MIN up / down
MAX up / down
Done Close
1216
template referenced ?
YES
NO
1218
Warning & prompting the user
PURSUE
CANCEL
1219
new name is valid?
YES
NO
1222
Updating STE_min variable
Updating STT table with local variables, saving WB
1217
Allocating memory for ST description, Creating & initialising new record in STT, Saving WB
1220
Warning the user
1221
Updating STE_max variable
1223
1226
Up / Down
Updating cell
1214
Format update
1215
Profile update
1224
Add
1225
Delete
Updating WB , clipboard from WB and STE_format variable
Updating WB, clipboard from WB and STE_profile variable
Inserting row and selecting cell in it, Introducing a new meta-element in WB, Assigning default values to STE_profile & STE_format, updating clipboard from WB.
Deleting row, Removing meta-element from the WB, updating clipboard from WB, selecting element row
Updating STE_format and STE_profile
1227

Fig. 12

Fig. 13A

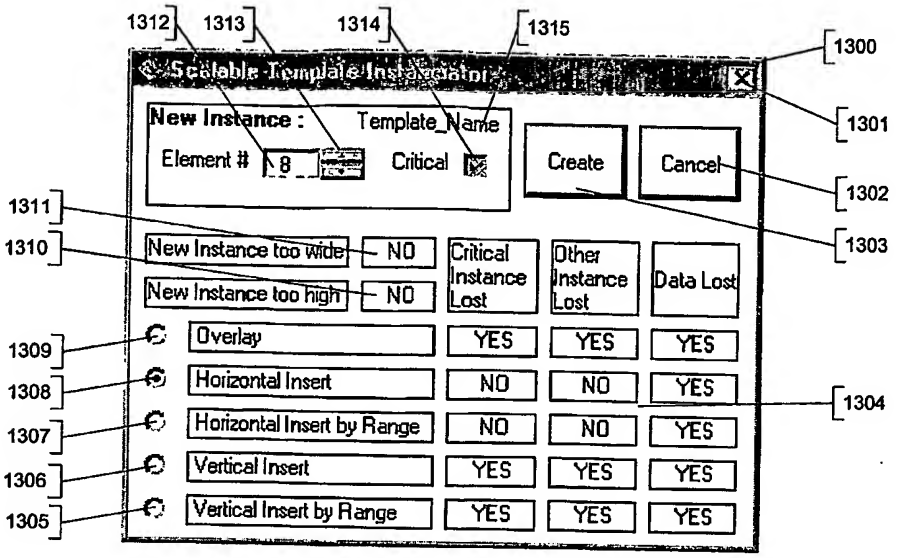


Fig. 13B

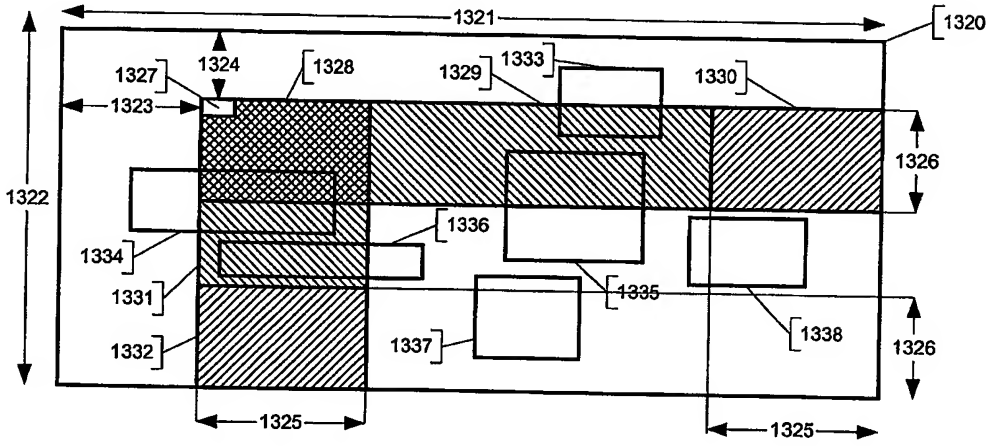


Fig. 13C

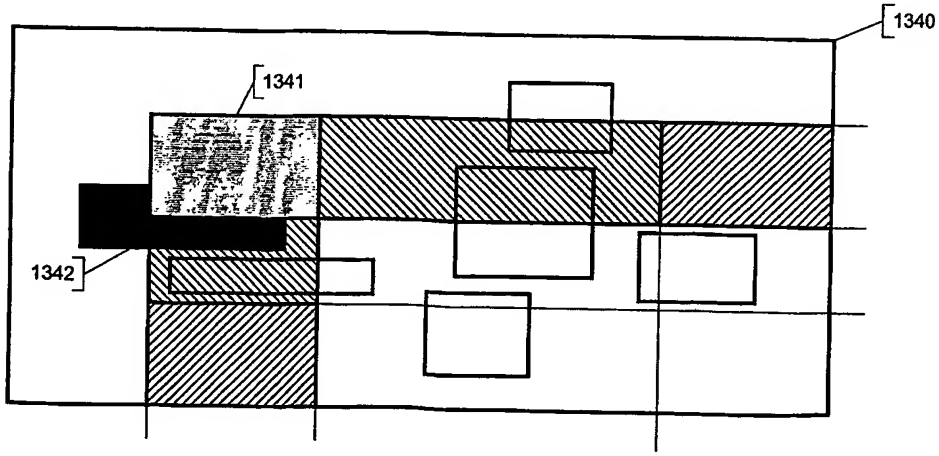


Fig. 13D

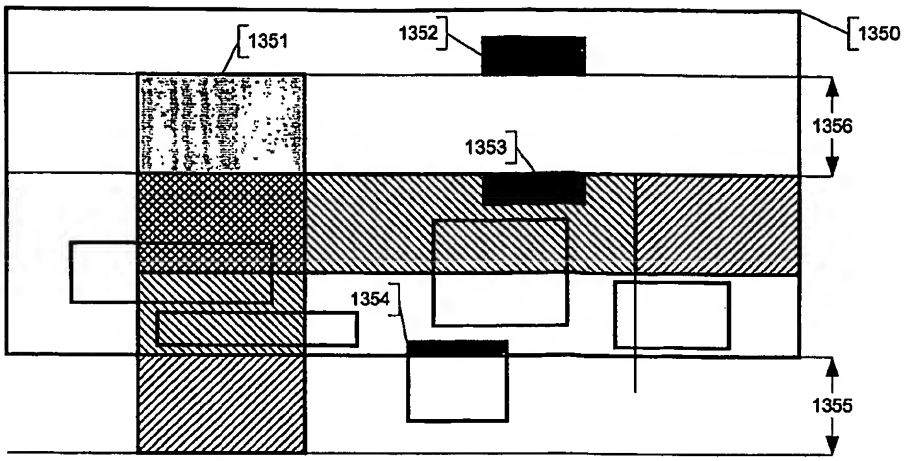


Fig. 13E

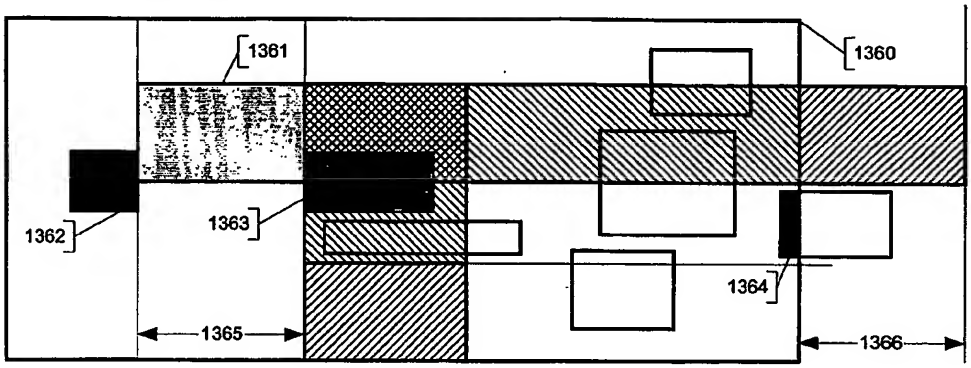


Fig. 13F

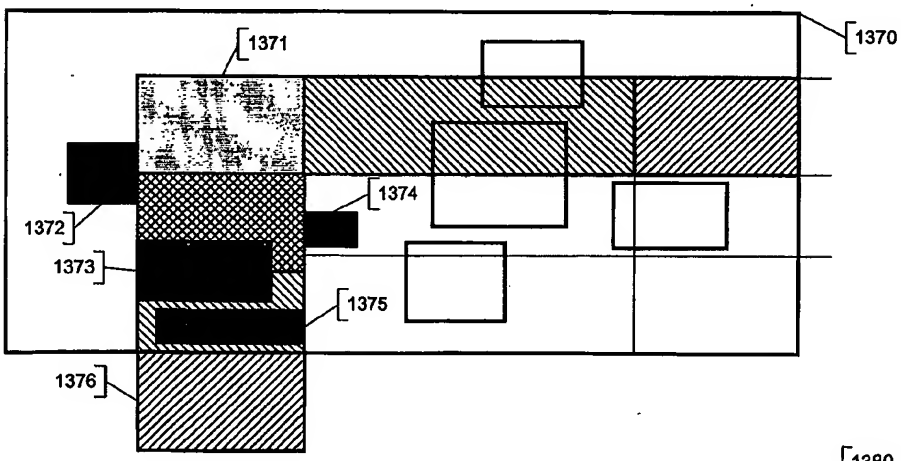
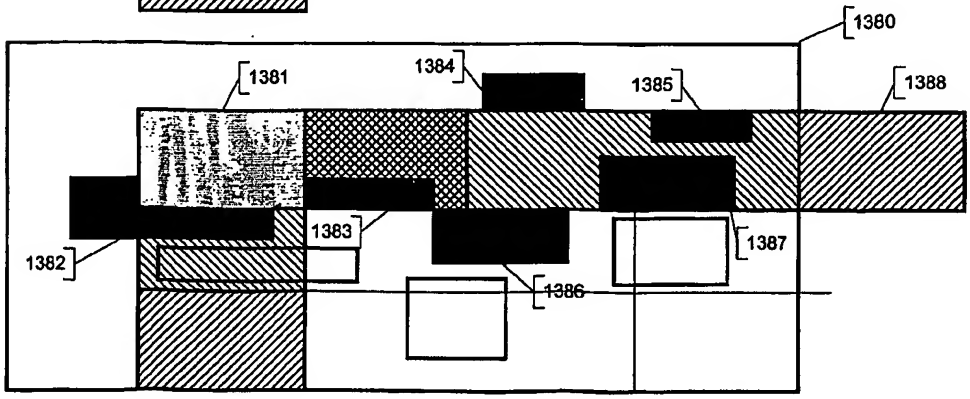


Fig. 13G



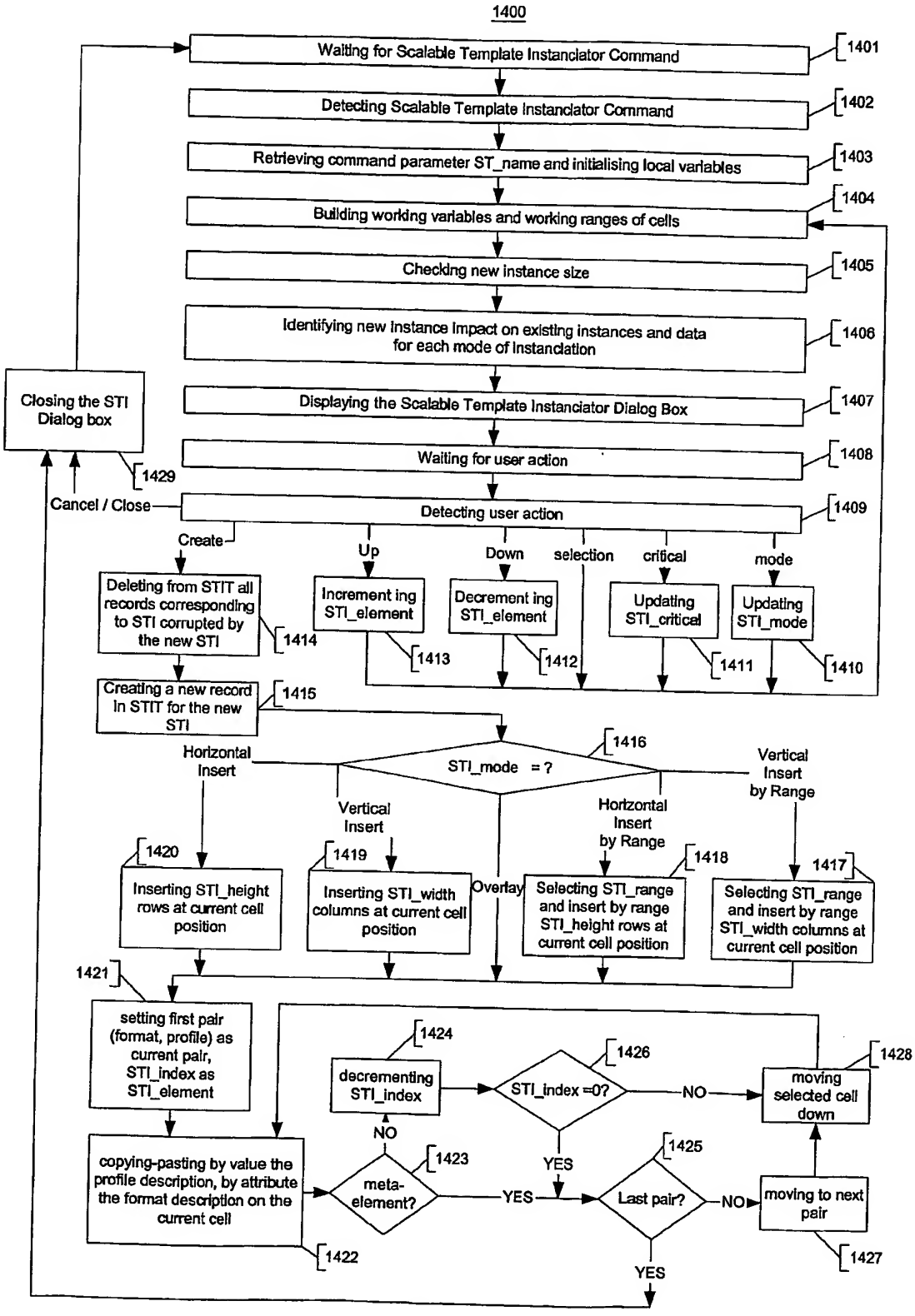

1400
Waiting for Scalable Template Instanciator Command
1401
Detecting Scalable Template Instanciator Command
1402
Retrieving command parameter ST_name and initialising local variables
1403
Building working variables and working ranges of cells
1404
Checking new instance size
1405
Identifying new instance impact on existing instances and data for each mode of instanciation
1406
Displaying the Scalable Template Instanciator Dialog Box
1407
Waiting for user action
1408
Detecting user action
1409
Closing the STI Dialog box
1429
Cancel / Close
Create
Up
Down
selection
critical
mode
Deleting from STIT all records corresponding to STI corrupted by the new STI
1414
Increment ing STI_element
1413
Decrement ing STI_element
1412
Updating STI_critical
1411
Updating STI_mode
1410
Creating a new record in STIT for the new STI
1415
STI_mode = ?
1416
Horizontal Insert
Vertical Insert
Horizontal Insert by Range
Vertical Insert by Range
Overlay
1420
Inserting STI_height rows at current cell position
1419
Inserting STI_width columns at current cell position
1418
Selecting STI_range and insert by range STI_height rows at current cell position
1417
Selecting STI_range and insert by range STI_width columns at current cell position
1421
setting first pair (format, profile) as current pair, STI_index as STI_element
1424
decrementing STI_index
1426
STI_index =0?
NO
YES
1428
moving selected cell down
copying-pasting by value the profile description, by attribute the format description on the current cell
1422
1423
meta-element?
YES
NO
1425
Last pair?
YES
NO
moving to next pair
1427

Fig. 14

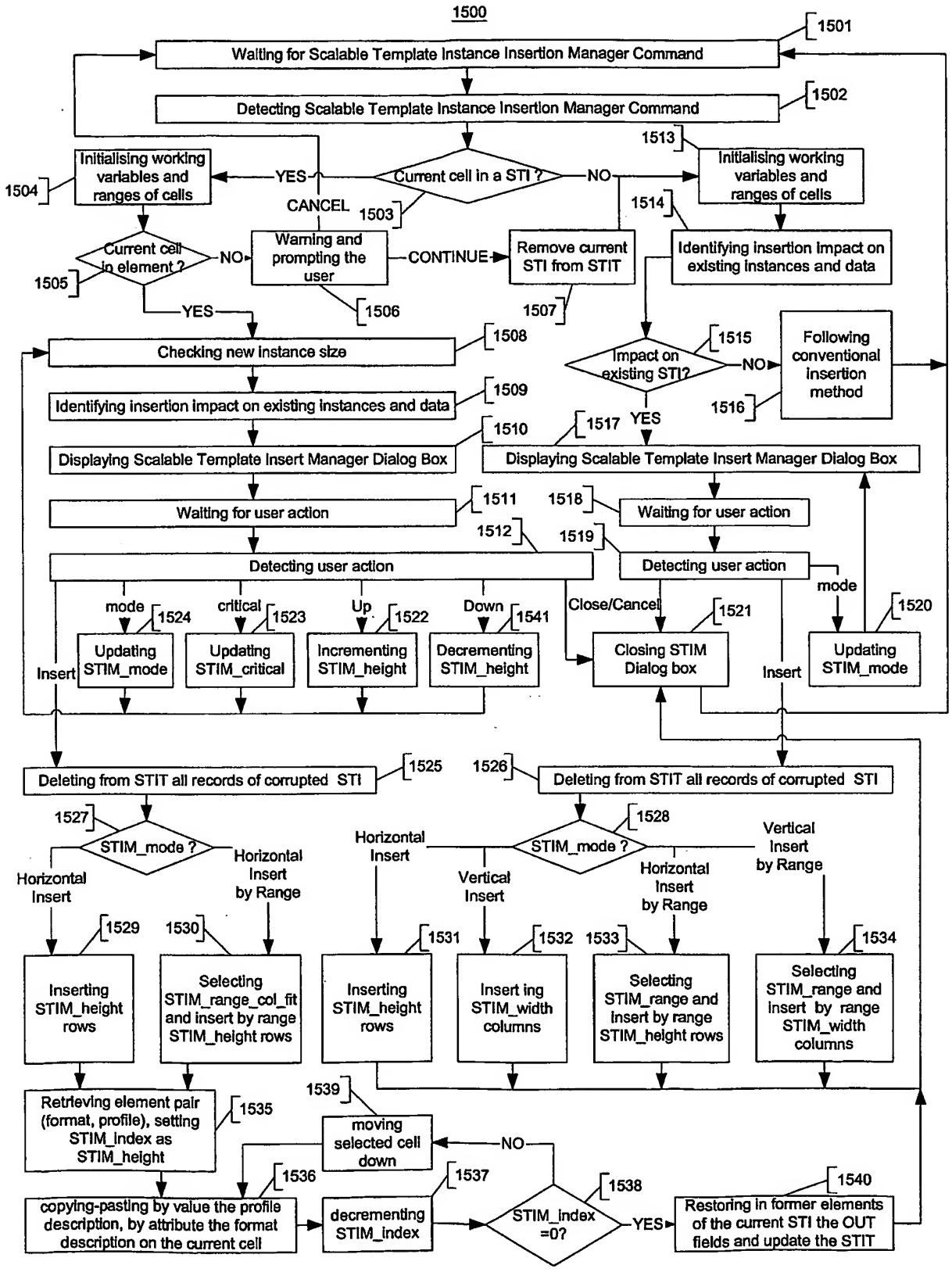

1500
1501
Waiting for Scalable Template Instance Insertion Manager Command
1502
Detecting Scalable Template Instance Insertion Manager Command
1513
Initialising working variables and ranges of cells
YES
Current cell in a STI ?
NO
1504
CANCEL
1503
1514
Current cell in element ?
NO
Warning and prompting the user
CONTINUE
Remove current STI from STIT
Identifying insertion impact on existing instances and data
1505
YES
1506
1507
Checking new instance size
1508
Impact on existing STI?
1515
NO
Following conventional insertion method
1516
Identifying insertion impact on existing instances and data
1509
YES
1517
1510
Displaying Scalable Template Insert Manager Dialog Box
Displaying Scalable Template Insert Manager Dialog Box
Waiting for user action
1511
1518
Waiting for user action
1512
1519
Detecting user action
Detecting user action
mode
1524
critical
1523
Up
1522
Down
1541
Close/Cancel
1521
mode
1520
Insert
Updating STIM_mode
Updating STIM_critical
Incrementing STIM_height
Decrementing STIM_height
Closing STIM Dialog box
Insert
Updating STIM_mode
Deleting from STIT all records of corrupted STI
1525
1526
Deleting from STIT all records of corrupted STI
1527
STIM_mode ?
Horizontal Insert
Horizontal Insert by Range
1528
STIM_mode ?
Horizontal Insert
Vertical Insert
Horizontal Insert by Range
Vertical Insert by Range
1529
1530
1531
1532
1533
1534
Inserting STIM_height rows
Selecting STIM_range_col_fit and insert by range STIM_height rows
Inserting STIM_height rows
Insert ing STIM_width columns
Selecting STIM_range and insert by range STIM_height rows
Selecting STIM_range and insert by range STIM_width columns
1539
Retrieving element pair (format, profile), setting STIM_Index as STIM_height
1535
moving selected cell down
NO
1536
1537
1538
1540
copying-pasting by value the profile description, by attribute the format description on the current cell
decrementing STIM_index
STIM_index =0?
YES
Restoring in former elements of the current STI the OUT fields and update the STIT

Fig. 15

Fig. 16A

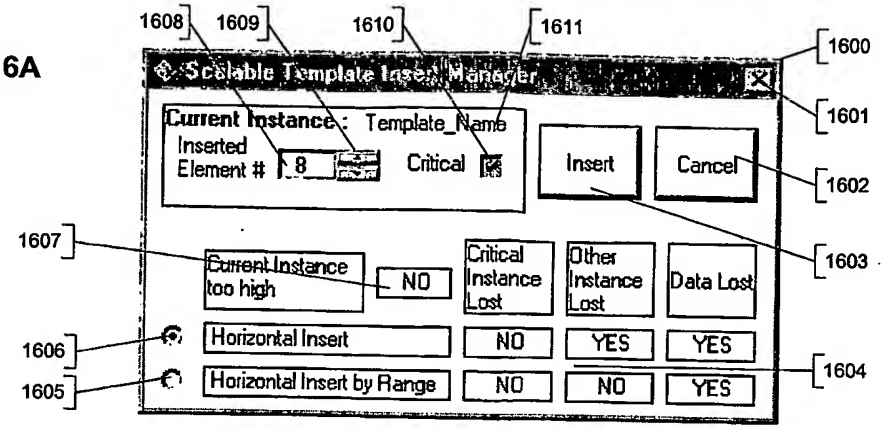


Fig. 16B

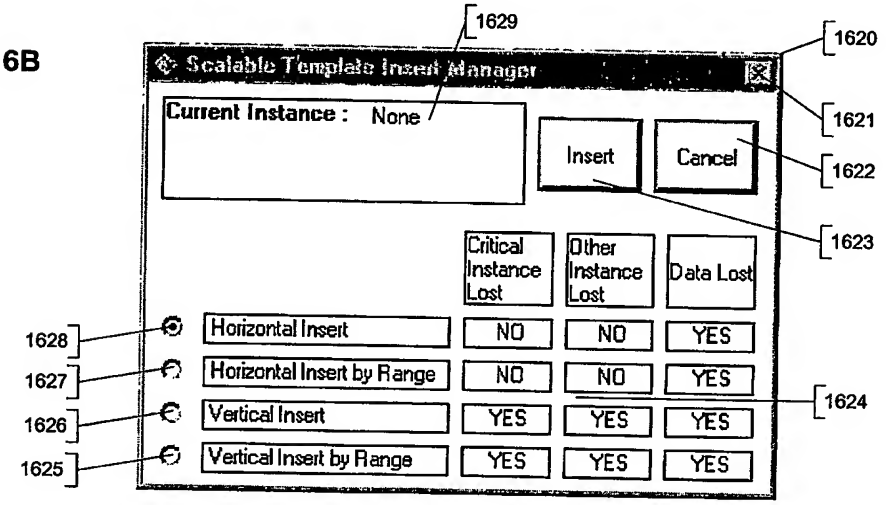


Fig. 17A

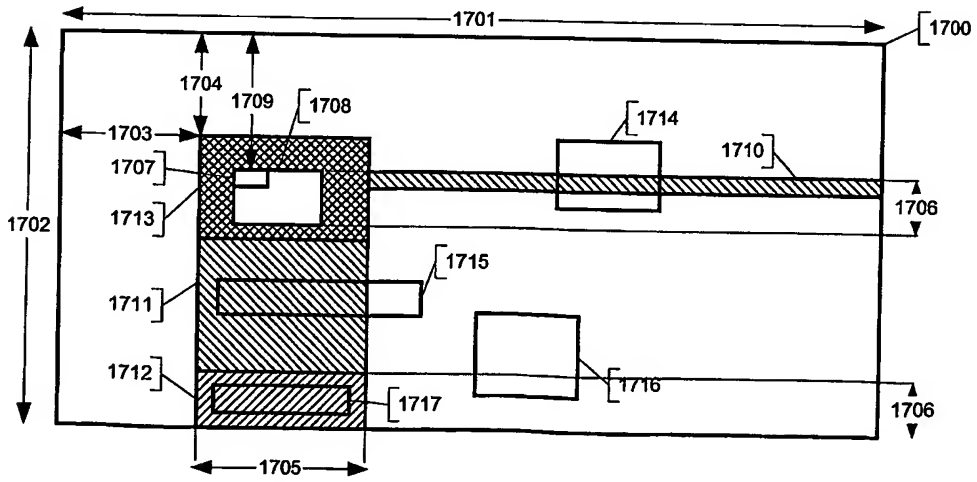


Fig. 17B

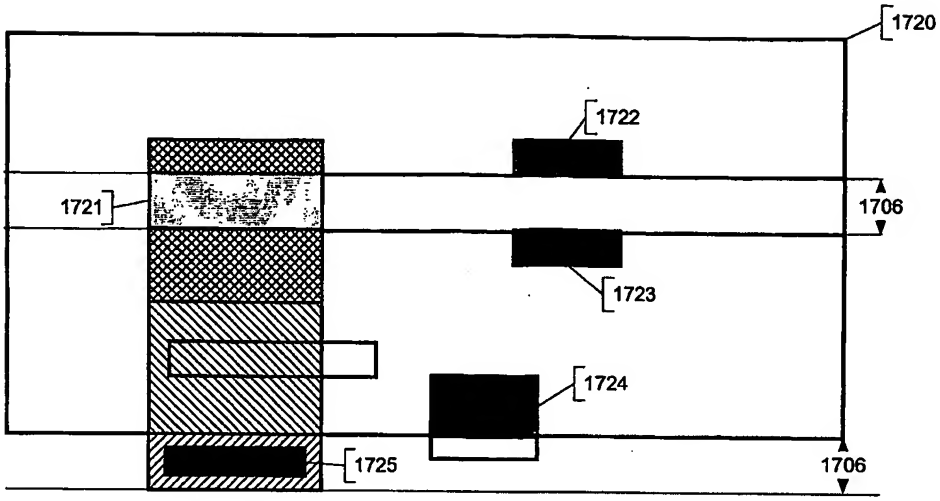


Fig. 17C

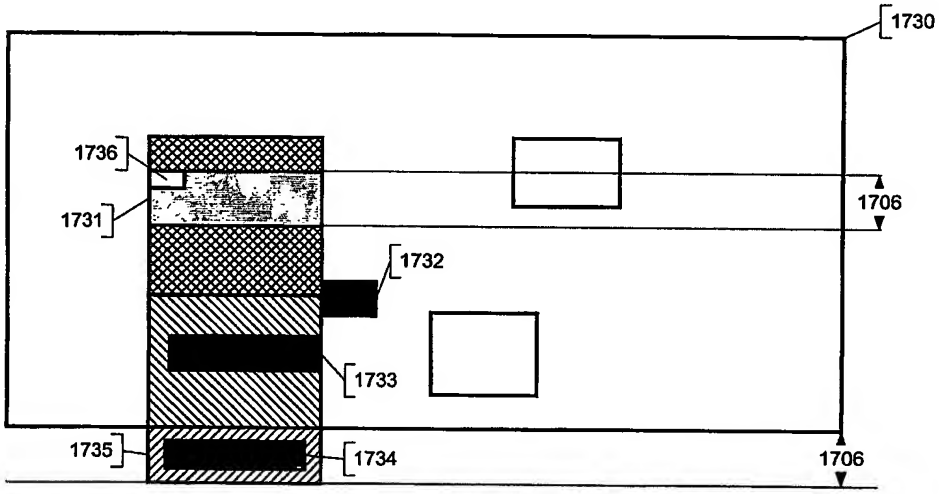


Fig. 17D

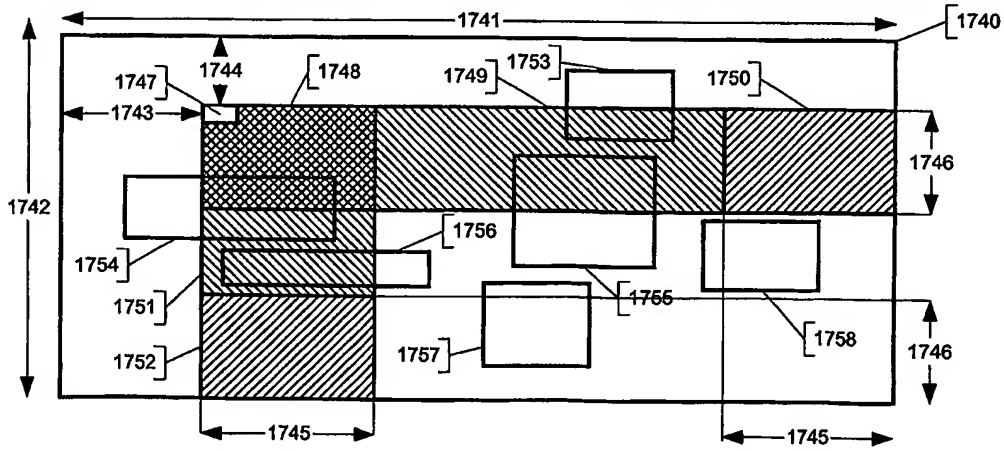


Fig. 17E

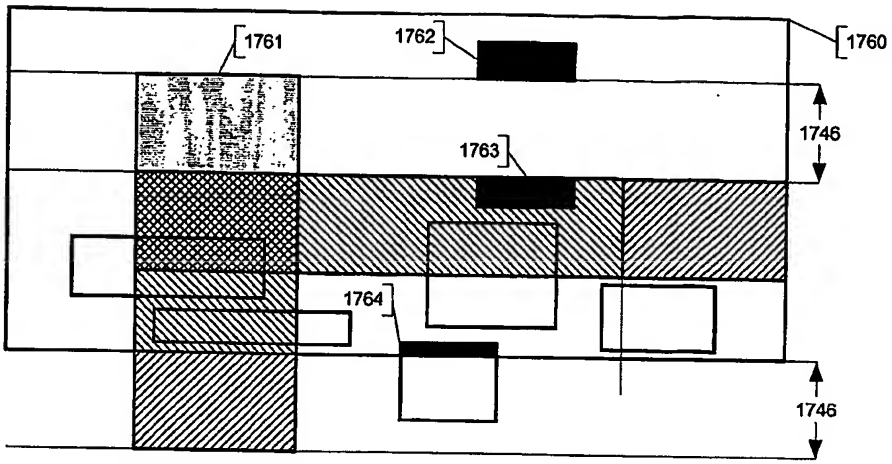


Fig. 17F

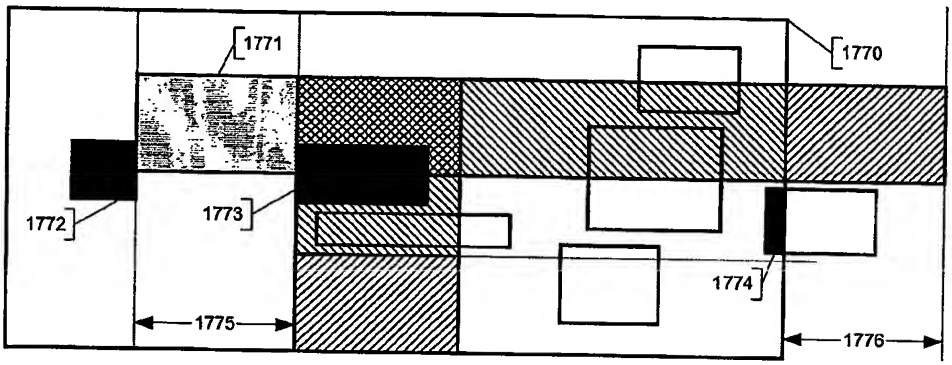


Fig. 17G

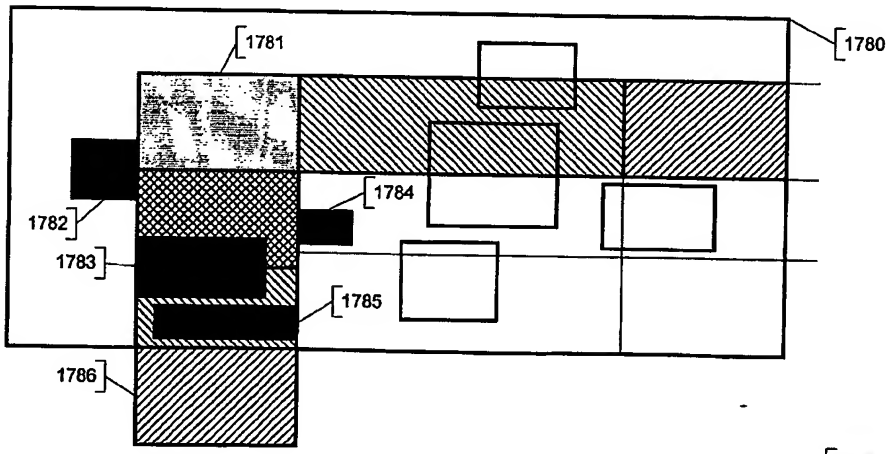
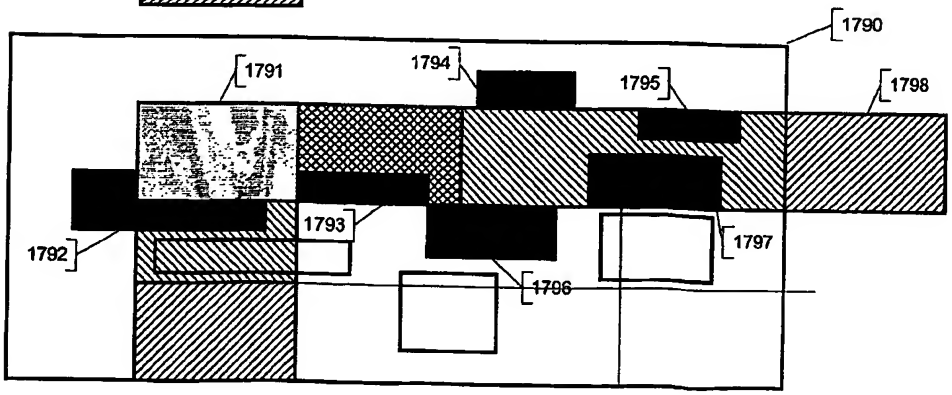


Fig. 17H



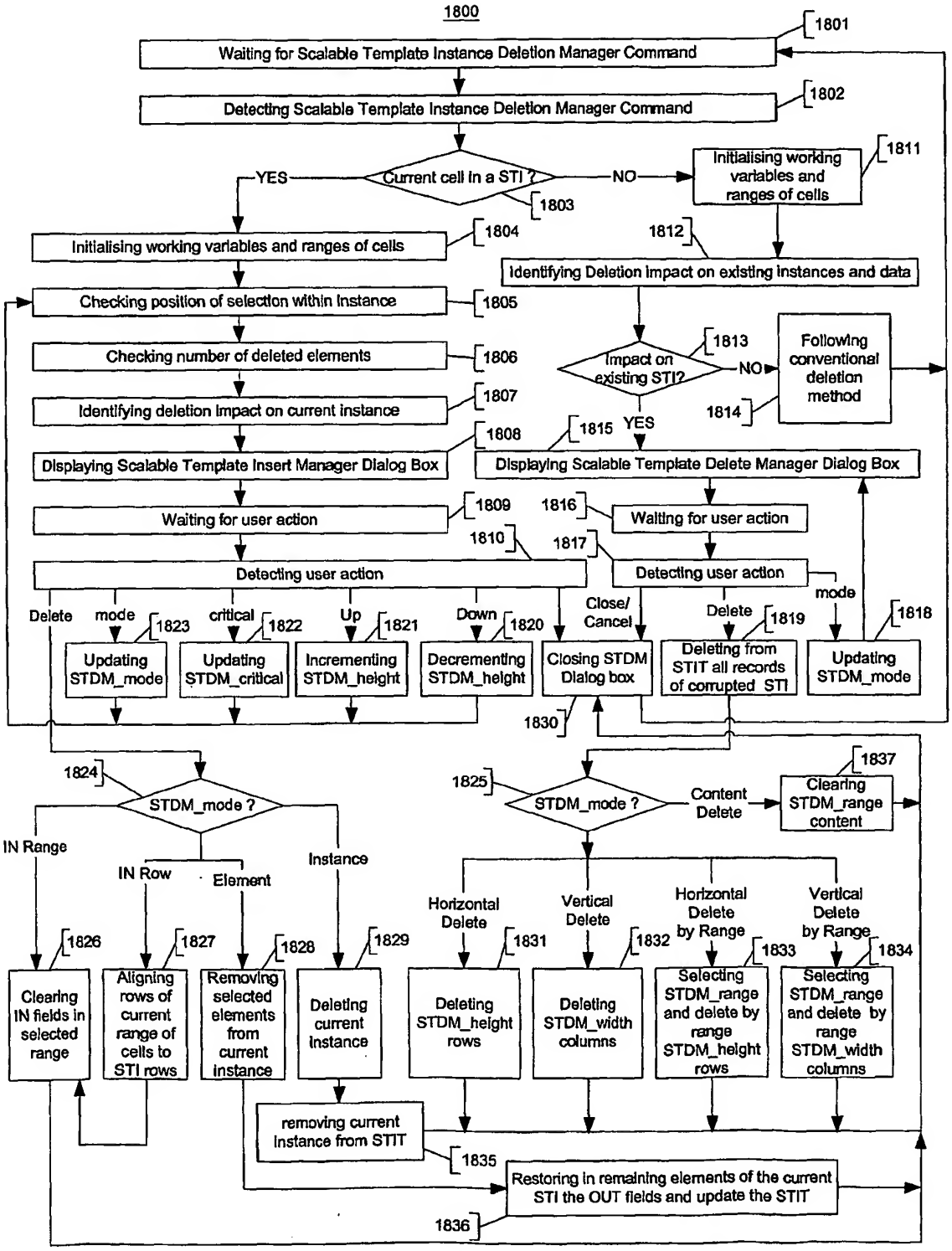

1800
1801
Waiting for Scalable Template Instance Deletion Manager Command
1802
Detecting Scalable Template Instance Deletion Manager Command
Current cell in a STI ?
1803
YES
NO
1811
Initialising working variables and ranges of cells
1804
Initialising working variables and ranges of cells
1812
Identifying Deletion Impact on existing instances and data
1805
Checking position of selection within Instance
1806
Checking number of deleted elements
1807
Identifying deletion impact on current instance
1813
Impact on existing STI?
NO
Following conventional deletion method
1814
1808
Displaying Scalable Template Insert Manager Dialog Box
1815
YES
Displaying Scalable Template Delete Manager Dialog Box
1809
Waiting for user action
1816
Waiting for user action
1810
1817
Detecting user action
Detecting user action
mode
Delete
mode
1823
critical
1822
Up
1821
Down
1820
Close/ Cancel
Delete
1819
1818
Updating STDM_mode
Updating STDM_critical
Incrementing STDM_height
Decrementing STDM_height
Closing STDM Dialog box
Deleting from STIT all records of corrupted STI
Updating STDM_mode
1830
1824
STDM_mode ?
IN Range
IN Row
Element
Instance
1826
1827
1828
1829
Clearing IN fields in selected range
Aligning rows of current range of cells to STI rows
Removing selected elements from current instance
Deleting current instance
1825
STDM_mode ?
Content Delete
1837
Clearing STDM_range content
Horizontal Delete
Vertical Delete
Horizontal Delete by Range
Vertical Delete by Range
1831
1832
1833
1834
Deleting STDM_height rows
Deleting STDM_width columns
Selecting STDM_range and delete by range STDM_height rows
Selecting STDM_range and delete by range STDM_width columns
removing current instance from STIT
1835
Restoring in remaining elements of the current STI the OUT fields and update the STIT
1836

Fig. 18

Fig. 19A

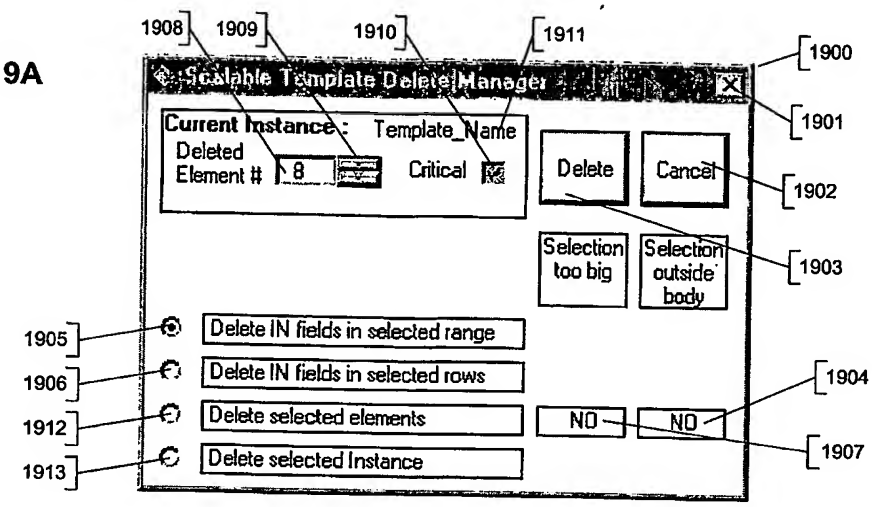


Fig. 19B

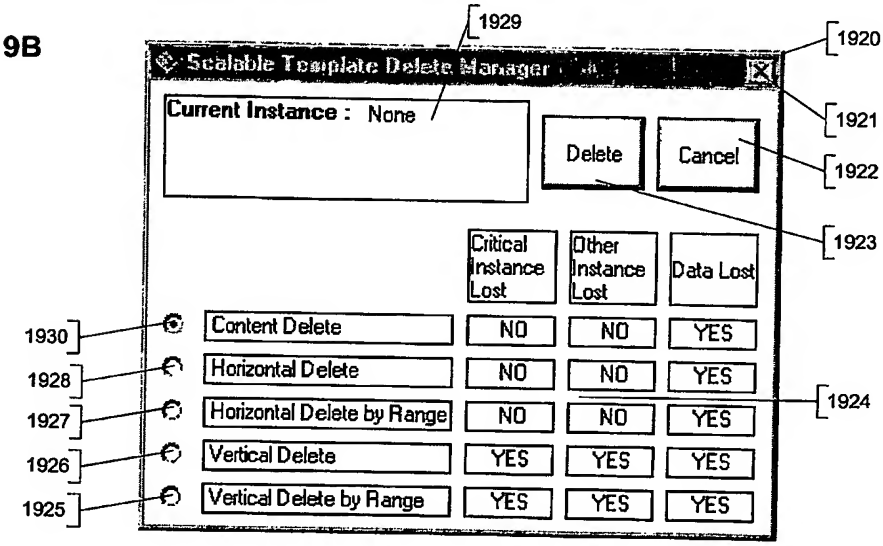


Fig. 20A

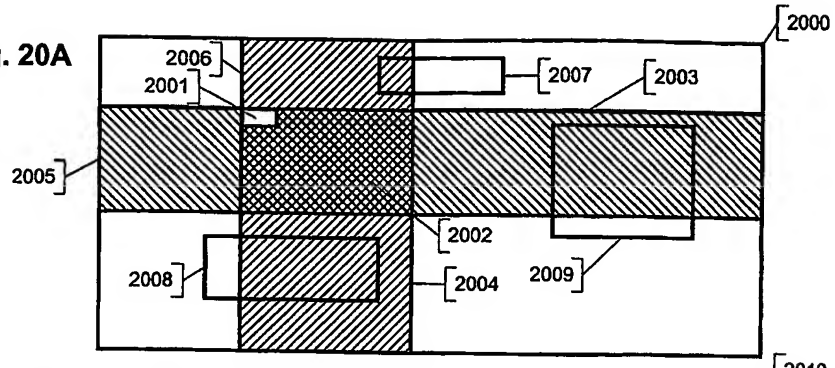


Fig. 20B

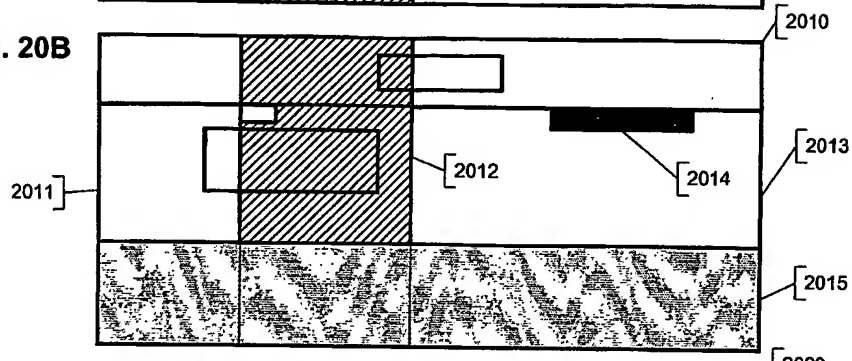


Fig. 20C

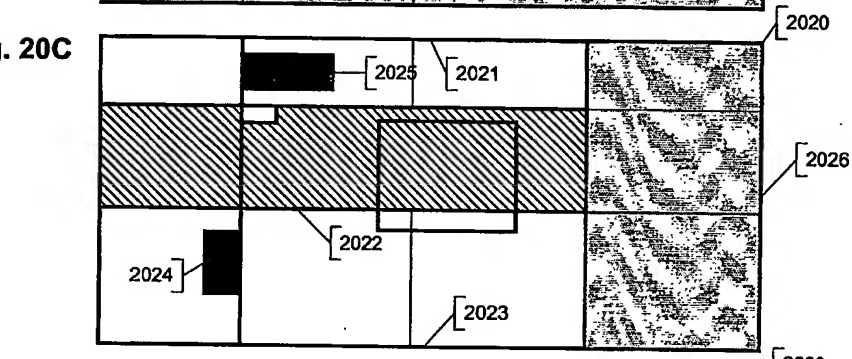


Fig. 20D

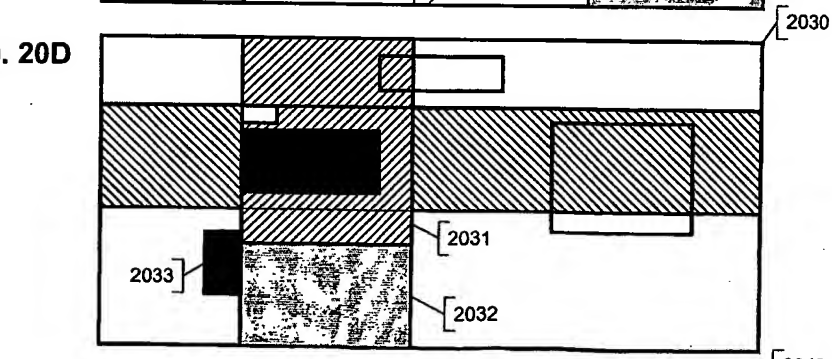
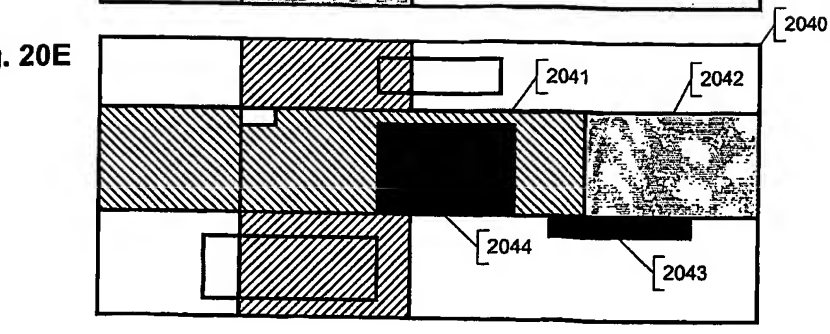


Fig. 20E



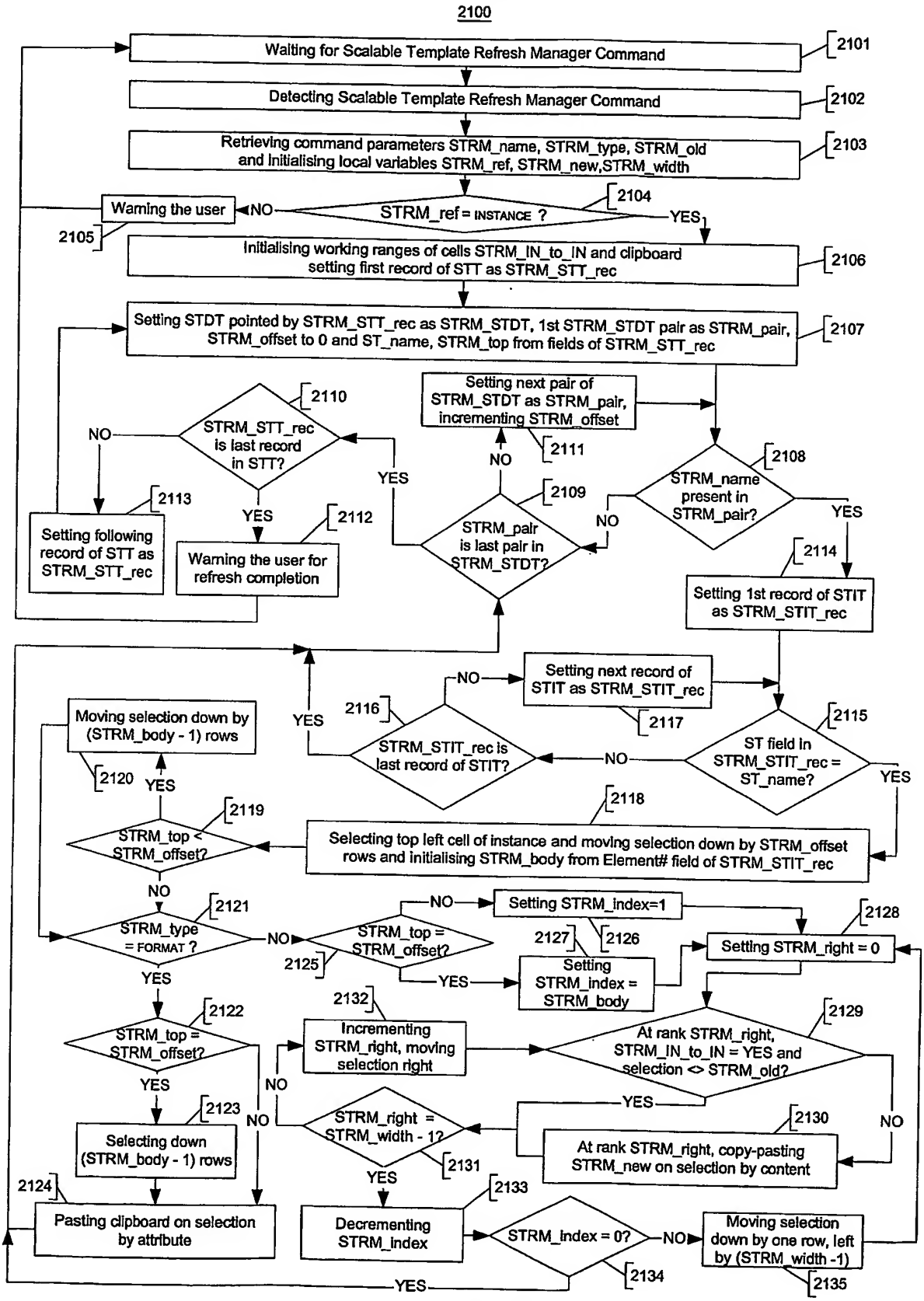

2100
Waiting for Scalable Template Refresh Manager Command
2101
Detecting Scalable Template Refresh Manager Command
2102
Retrieving command parameters STRM_name, STRM_type, STRM_old and Initialising local variables STRM_ref, STRM_new,STRM_width
2103
STRM_ref = INSTANCE ?
2104
NO
YES
Warning the user
2105
Initialising working ranges of cells STRM_IN_to_IN and clipboard setting first record of STT as STRM_STT_rec
2106
Setting STDT pointed by STRM_STT_rec as STRM_STDT, 1st STRM_STDT pair as STRM_pair, STRM_offset to 0 and ST_name, STRM_top from fields of STRM_STT_rec
2107
STRM_STT_rec is last record in STT?
2110
NO
YES
Setting following record of STT as STRM_STT_rec
2113
Warning the user for refresh completion
2112
Setting next pair of STRM_STDT as STRM_pair, incrementing STRM_offset
2111
NO
STRM_pair is last pair in STRM_STDT?
2109
NO
STRM_name present in STRM_pair?
2108
YES
Setting 1st record of STIT as STRM_STIT_rec
2114
Setting next record of STIT as STRM_STIT_rec
2117
NO
ST field in STRM_STIT_rec = ST_name?
2115
YES
NO
STRM_STIT_rec is last record of STIT?
2116
YES
Moving selection down by (STRM_body - 1) rows
2120
YES
Selecting top left cell of instance and moving selection down by STRM_offset rows and initialising STRM_body from Element# field of STRM_STIT_rec
2118
STRM_top < STRM_offset?
2119
NO
STRM_type = FORMAT ?
2121
NO
YES
STRM_top = STRM_offset?
2125
NO
YES
Setting STRM_index=1
2126
Setting STRM_index = STRM_body
2127
Setting STRM_right = 0
2128
STRM_top = STRM_offset?
2122
YES
Incrementing STRM_right, moving selection right
2132
At rank STRM_right, STRM_IN_to_IN = YES and selection <> STRM_old?
2129
YES
NO
Selecting down (STRM_body - 1) rows
2123
STRM_right = STRM_width - 1?
2131
NO
YES
At rank STRM_right, copy-pasting STRM_new on selection by content
2130
NO
Pasting clipboard on selection by attribute
2124
Decrementing STRM_index
2133
STRM_index = 0?
2134
NO
YES
Moving selection down by one row, left by (STRM_width -1)
2135

Fig. 21

Fig. 22A

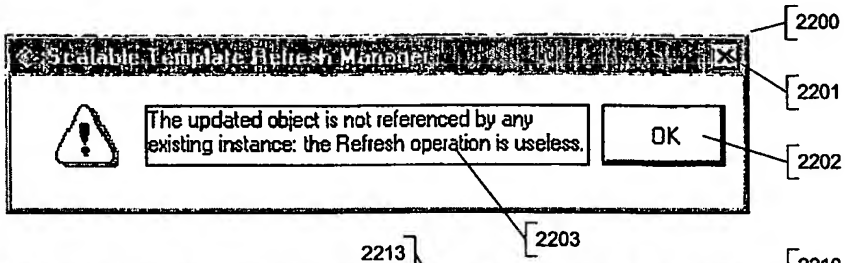


Fig. 22B

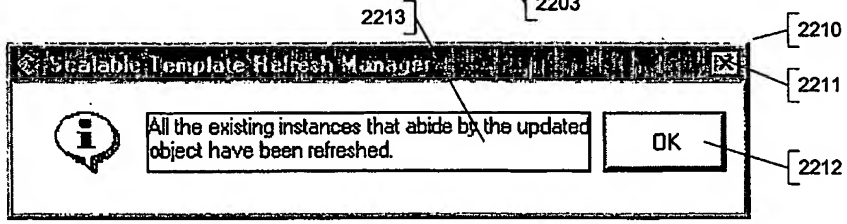


Fig. 23A

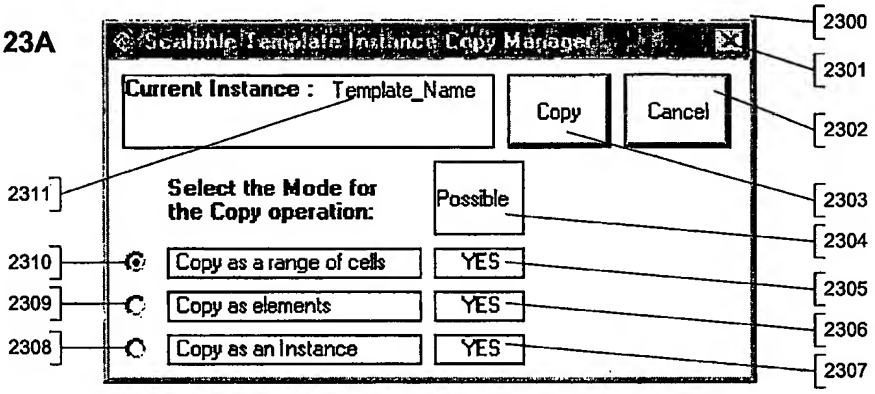


Fig. 23B

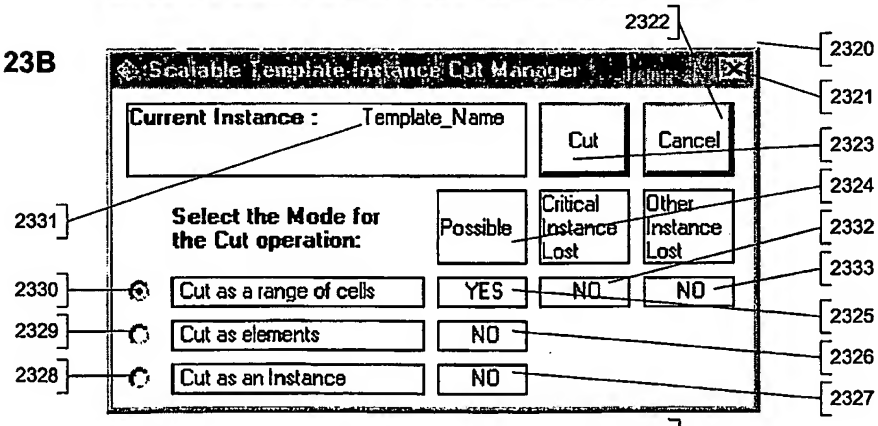
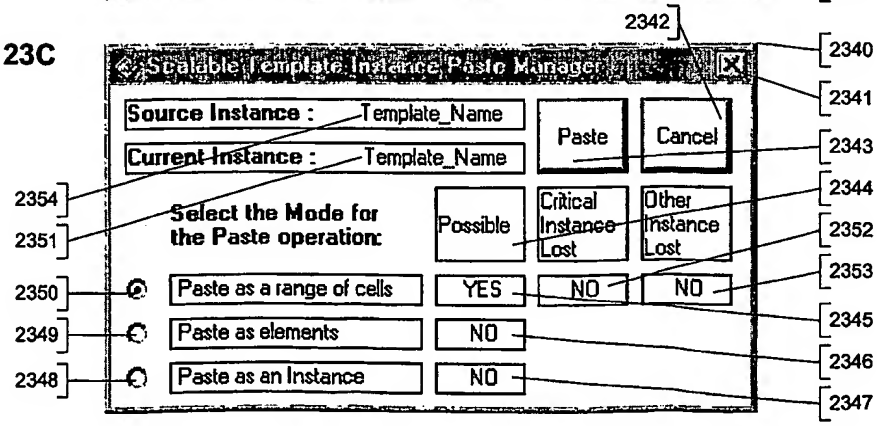


Fig. 23C



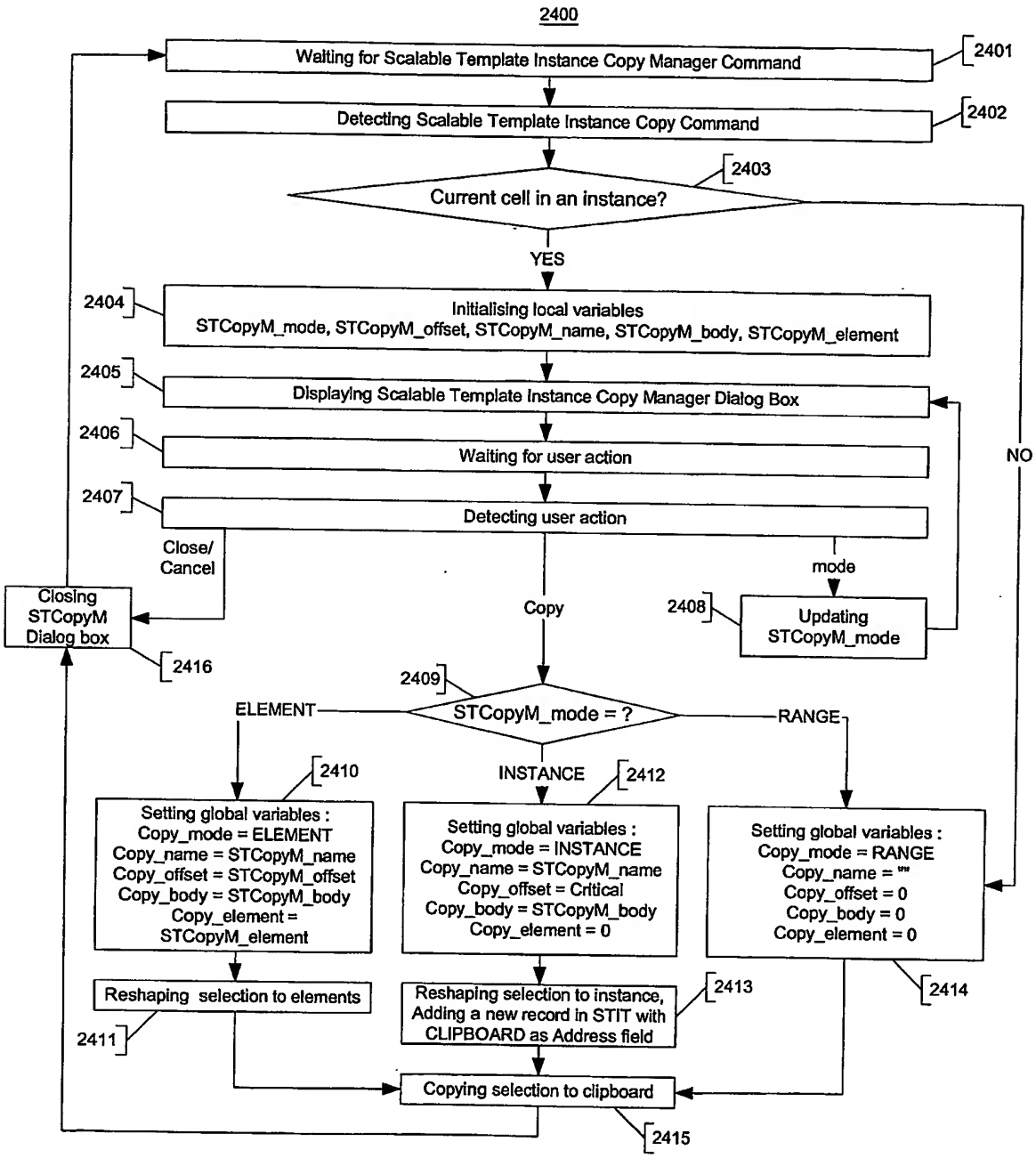

2400
Waiting for Scalable Template Instance Copy Manager Command
2401
Detecting Scalable Template Instance Copy Command
2402
Current cell in an instance?
2403
YES
NO
2404
Initialising local variables
STCopyM_mode, STCopyM_offset, STCopyM_name, STCopyM_body, STCopyM_element
2405
Displaying Scalable Template Instance Copy Manager Dialog Box
2406
Waiting for user action
2407
Detecting user action
Close/
Cancel
Copy
mode
2408
Updating
STCopyM_mode
Closing
STCopyM
Dialog box
2416
2409
STCopyM_mode = ?
ELEMENT
INSTANCE
RANGE
2410
Setting global variables :
Copy_mode = ELEMENT
Copy_name = STCopyM_name
Copy_offset = STCopyM_offset
Copy_body = STCopyM_body
Copy_element =
STCopyM_element
2412
Setting global variables :
Copy_mode = INSTANCE
Copy_name = STCopyM_name
Copy_offset = Critical
Copy_body = STCopyM_body
Copy_element = 0
Setting global variables :
Copy_mode = RANGE
Copy_name = ""
Copy_offset = 0
Copy_body = 0
Copy_element = 0
2414
Reshaping selection to elements
2411
Reshaping selection to instance,
Adding a new record in STIT with
CLIPBOARD as Address field
2413
Copying selection to clipboard
2415

Fig. 24A

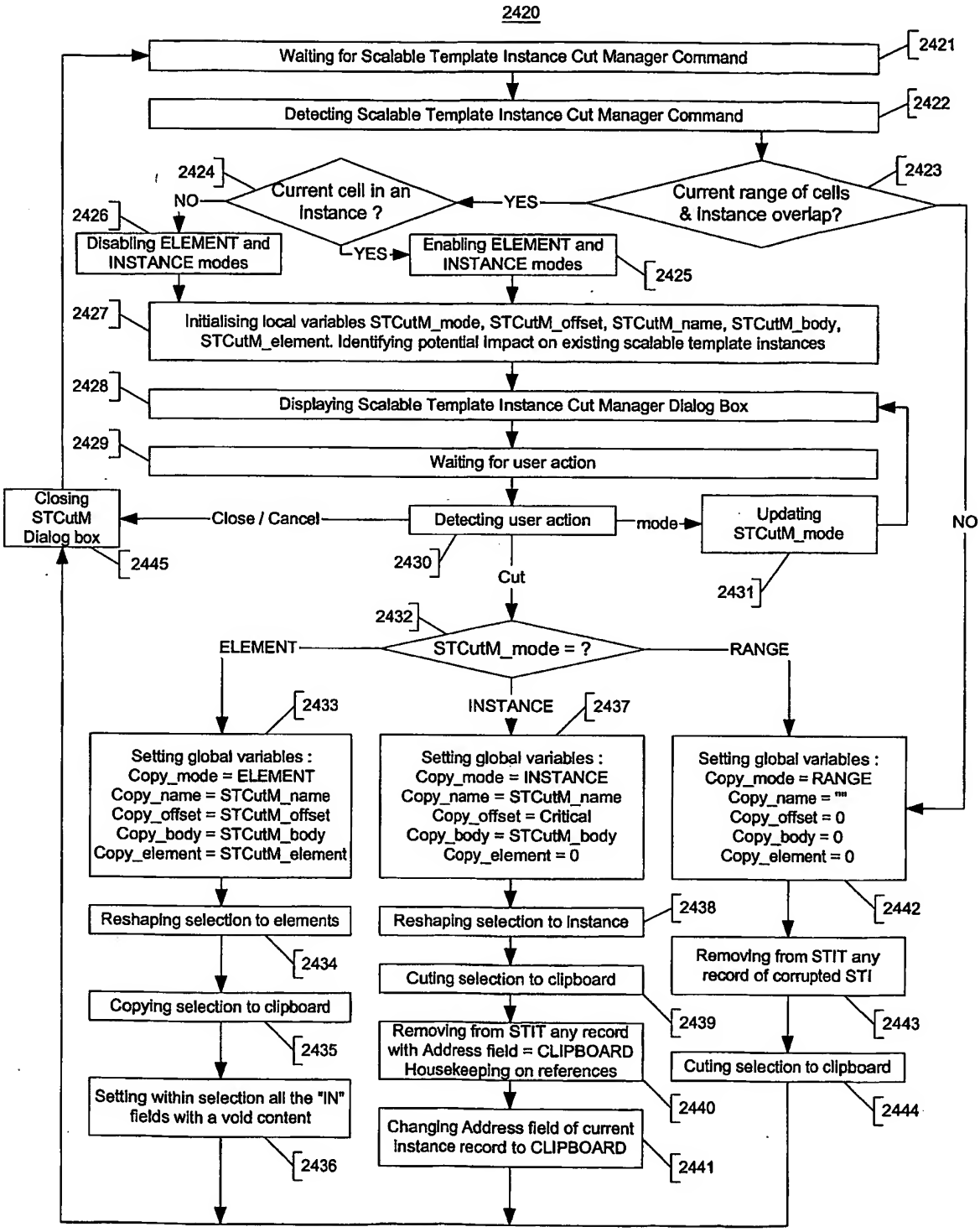

2420
Waiting for Scalable Template Instance Cut Manager Command
2421
Detecting Scalable Template Instance Cut Manager Command
2422
2424
Current cell in an Instance ?
NO
YES
2423
Current range of cells & Instance overlap?
2426
Disabling ELEMENT and INSTANCE modes
YES
Enabling ELEMENT and INSTANCE modes
2425
2427
Initialising local variables STCutM_mode, STCutM_offset, STCutM_name, STCutM_body, STCutM_element. Identifying potential impact on existing scalable template instances
2428
Displaying Scalable Template Instance Cut Manager Dialog Box
2429
Waiting for user action
Closing STCutM Dialog box
2445
Close / Cancel
Detecting user action
2430
mode
Updating STCutM_mode
2431
NO
Cut
2432
ELEMENT
STCutM_mode = ?
RANGE
INSTANCE
2433
2437
Setting global variables :
Copy_mode = ELEMENT
Copy_name = STCutM_name
Copy_offset = STCutM_offset
Copy_body = STCutM_body
Copy_element = STCutM_element
Setting global variables :
Copy_mode = INSTANCE
Copy_name = STCutM_name
Copy_offset = Critical
Copy_body = STCutM_body
Copy_element = 0
Setting global variables :
Copy_mode = RANGE
Copy_name = ""
Copy_offset = 0
Copy_body = 0
Copy_element = 0
Reshaping selection to elements
2434
Reshaping selection to instance
2438
2442
Copying selection to clipboard
2435
Cuting selection to clipboard
2439
Removing from STIT any record of corrupted STI
2443
Setting within selection all the "IN" fields with a void content
2436
Removing from STIT any record with Address field = CLIPBOARD Housekeeping on references
2440
Cuting selection to clipboard
2444
Changing Address field of current instance record to CLIPBOARD
2441

Fig. 24B

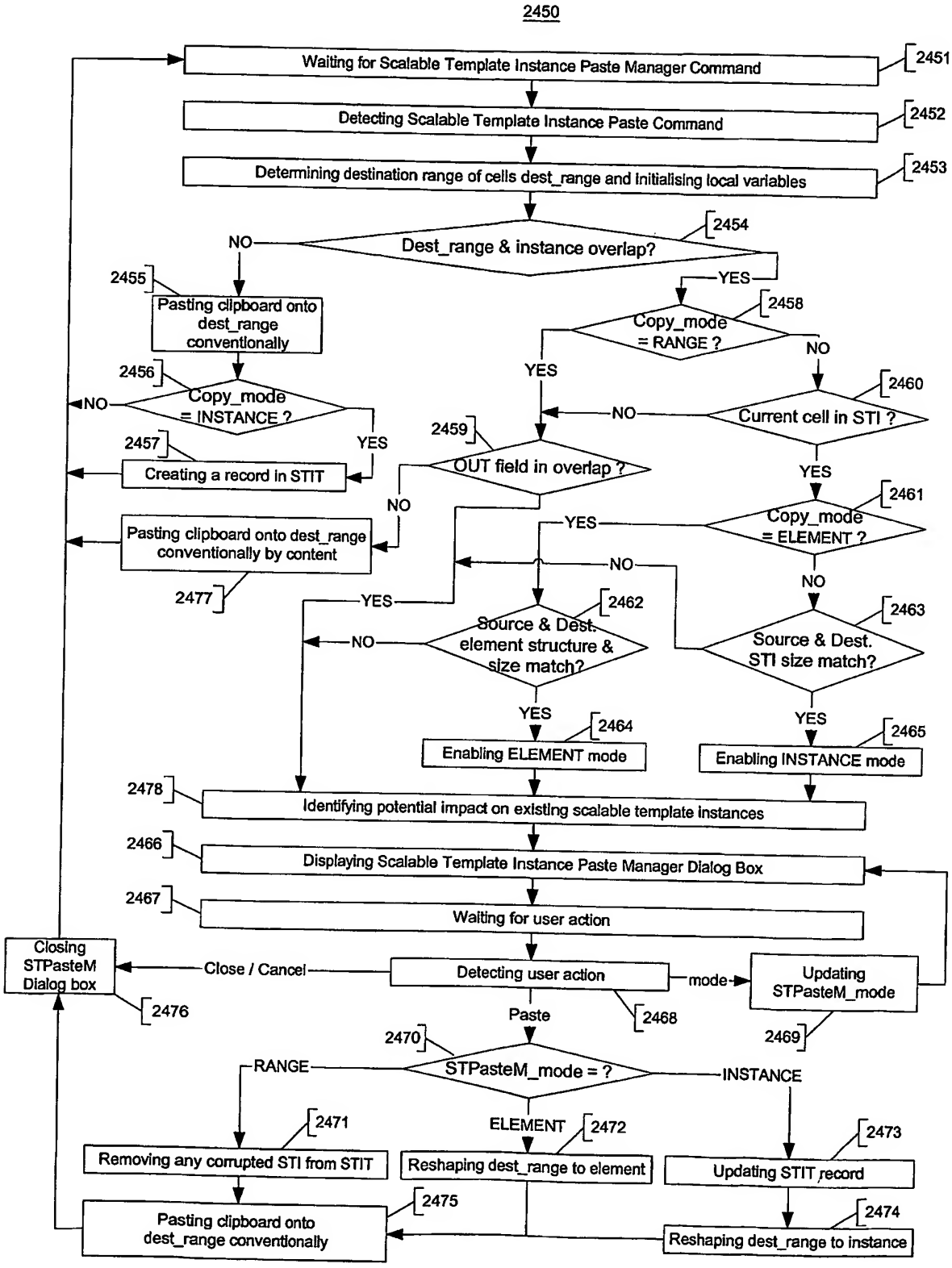

2450
Waiting for Scalable Template Instance Paste Manager Command
2451
Detecting Scalable Template Instance Paste Command
2452
Determining destination range of cells dest_range and initialising local variables
2453
Dest_range & instance overlap?
2454
NO
YES
2455
Pasting clipboard onto dest_range conventionally
Copy_mode = RANGE ?
2458
YES
NO
2456
Copy_mode = INSTANCE ?
NO
YES
Current cell in STI ?
2460
NO
2459
OUT field in overlap ?
YES
2457
Creating a record in STIT
NO
Copy_mode = ELEMENT ?
2461
YES
Pasting clipboard onto dest_range conventionally by content
NO
2477
YES
NO
Source & Dest. element structure & size match?
2462
Source & Dest. STI size match?
2463
YES
YES
Enabling ELEMENT mode
2464
Enabling INSTANCE mode
2465
2478
Identifying potential impact on existing scalable template instances
2466
Displaying Scalable Template Instance Paste Manager Dialog Box
2467
Waiting for user action
Closing STPasteM Dialog box
Close / Cancel
Detecting user action
mode
Updating STPasteM_mode
2476
Paste
2468
2469
2470
STPasteM_mode = ?
RANGE
INSTANCE
ELEMENT
2471
2472
2473
Removing any corrupted STI from STIT
Reshaping dest_range to element
Updating STIT record
2475
2474
Pasting clipboard onto dest_range conventionally
Reshaping dest_range to instance

Fig. 24C

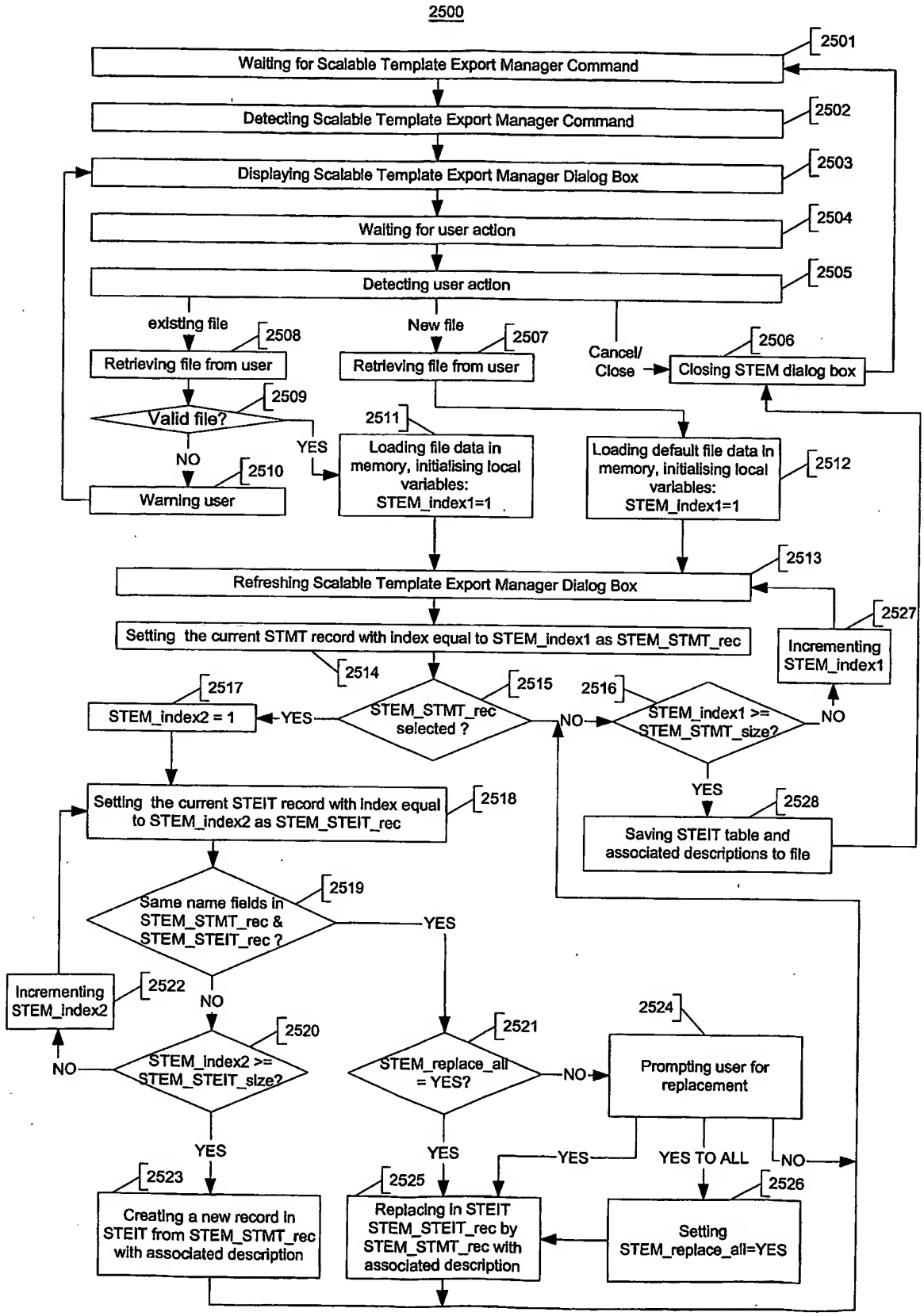

2500
2501
Waiting for Scalable Template Export Manager Command
2502
Detecting Scalable Template Export Manager Command
2503
Displaying Scalable Template Export Manager Dialog Box
2504
Waiting for user action
2505
Detecting user action
existing file
2508
Retrieving file from user
2509
Valid file?
NO
2510
Warning user
YES
2511
Loading file data in memory, initialising local variables: STEM_index1=1
New file
2507
Retrieving file from user
Cancel/ Close
2506
Closing STEM dialog box
Loading default file data in memory, initialising local variables: STEM_index1=1
2512
2513
Refreshing Scalable Template Export Manager Dialog Box
Setting the current STMT record with index equal to STEM_index1 as STEM_STMT_rec
2514
2515
STEM_STMT_rec selected ?
YES
2517
STEM_index2 = 1
NO
2516
STEM_index1 >= STEM_STMT_size?
NO
2527
Incrementing STEM_index1
YES
2528
Saving STEIT table and associated descriptions to file
Setting the current STEIT record with index equal to STEM_index2 as STEM_STEIT_rec
2518
2519
Same name fields in STEM_STMT_rec & STEM_STEIT_rec ?
YES
NO
2522
Incrementing STEM_index2
NO
2520
STEM_index2 >= STEM_STEIT_size?
YES
2523
Creating a new record in STEIT from STEM_STMT_rec with associated description
2521
STEM_replace_all = YES?
NO
2524
Prompting user for replacement
YES
2525
Replacing in STEIT STEM_STEIT_rec by STEM_STMT_rec with associated description
YES
YES TO ALL
NO
2526
Setting STEM_replace_all=YES

Fig. 25A

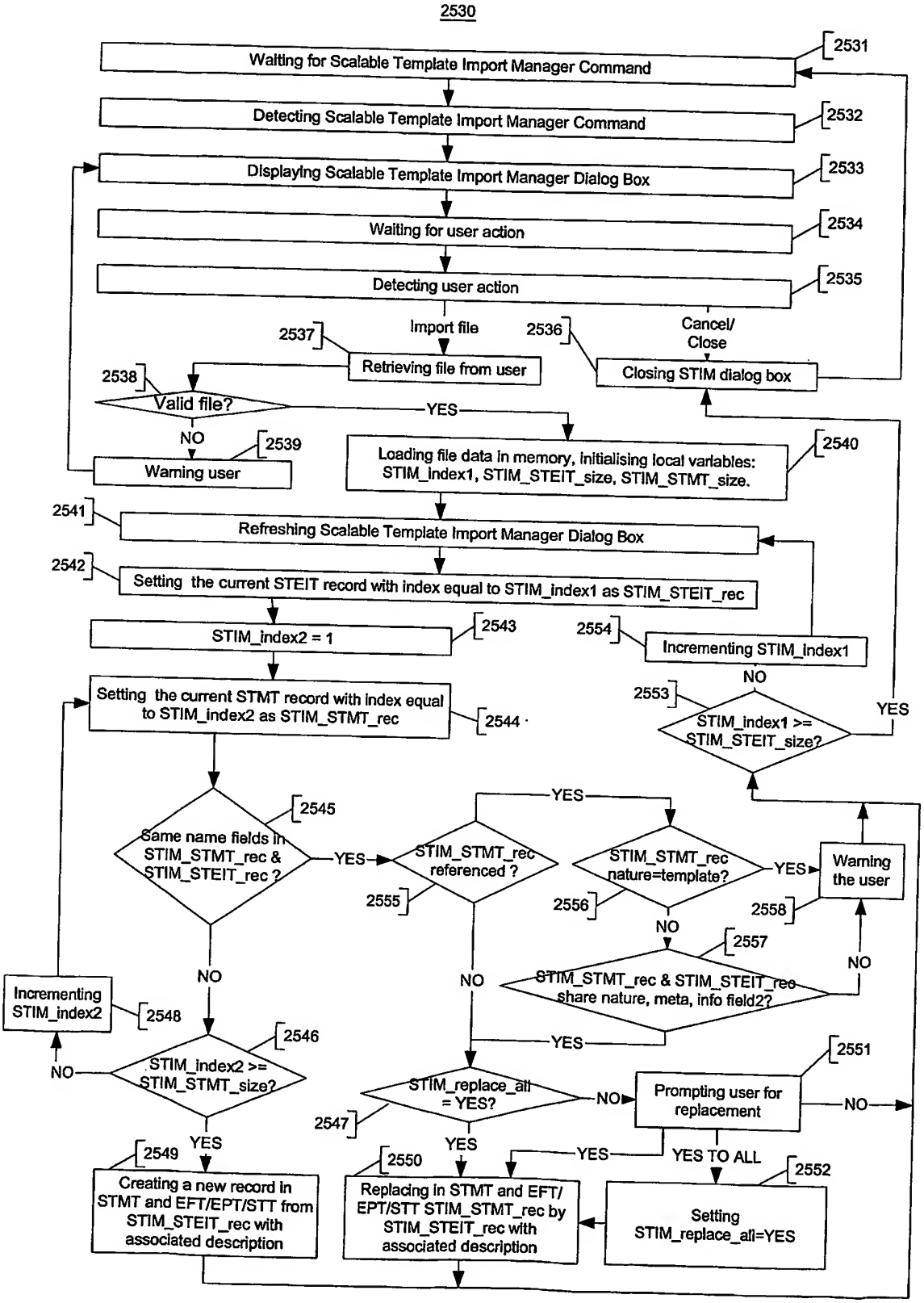

2530
Waiting for Scalable Template Import Manager Command
2531
Detecting Scalable Template Import Manager Command
2532
Displaying Scalable Template Import Manager Dialog Box
2533
Waiting for user action
2534
Detecting user action
2535
Import file
Cancel/ Close
2537
2536
Retrieving file from user
Closing STIM dialog box
2538
Valid file?
YES
NO
2539
Warning user
Loading file data in memory, initialising local variables: STIM_index1, STIM_STEIT_size, STIM_STMT_size.
2540
2541
Refreshing Scalable Template Import Manager Dialog Box
2542
Setting the current STEIT record with index equal to STIM_index1 as STIM_STEIT_rec
STIM_index2 = 1
2543
2554
Incrementing STIM_index1
NO
2553
STIM_index1 >= STIM_STEIT_size?
YES
Setting the current STMT record with index equal to STIM_index2 as STIM_STMT_rec
2544
2545
Same name fields in STIM_STMT_rec & STIM_STEIT_rec ?
YES
STIM_STMT_rec referenced ?
YES
2555
STIM_STMT_rec nature=template?
YES
2556
Warning the user
2558
NO
2557
STIM_STMT_rec & STIM_STEIT_rec share nature, meta, info field2?
NO
NO
Incrementing STIM_index2
2548
NO
2546
STIM_index2 >= STIM_STMT_size?
YES
2549
Creating a new record in STMT and EFT/EPT/STT from STIM_STEIT_rec with associated description
YES
2547
STIM_replace_all = YES?
NO
Prompting user for replacement
2551
NO
YES
YES
YES TO ALL
2550
Replacing in STMT and EFT/ EPT/STT STIM_STMT_rec by STIM_STEIT_rec with associated description
2552
Setting STIM_replace_all=YES

Fig. 25B

Fig. 26A

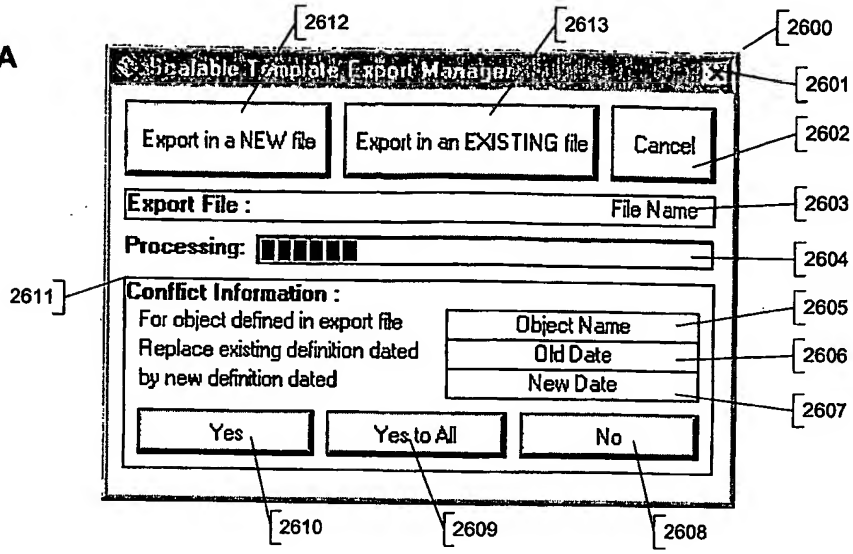


Fig. 26B

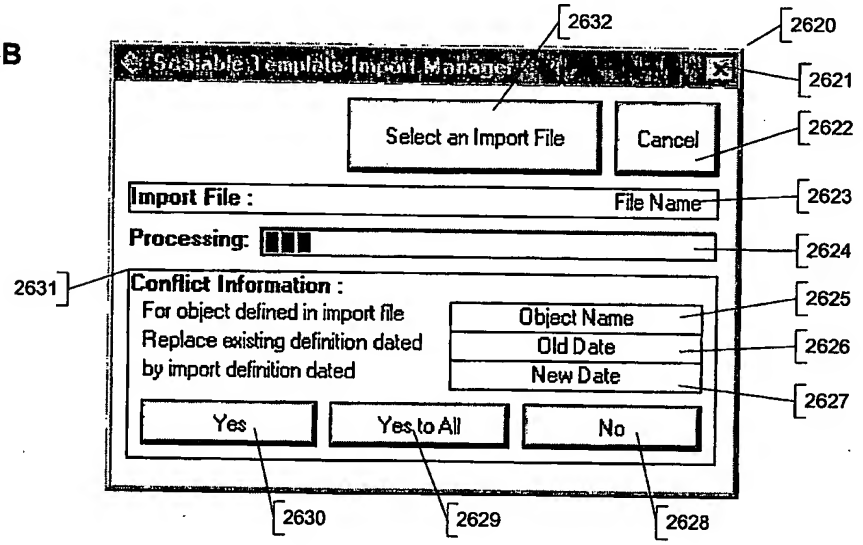


Fig. 26C

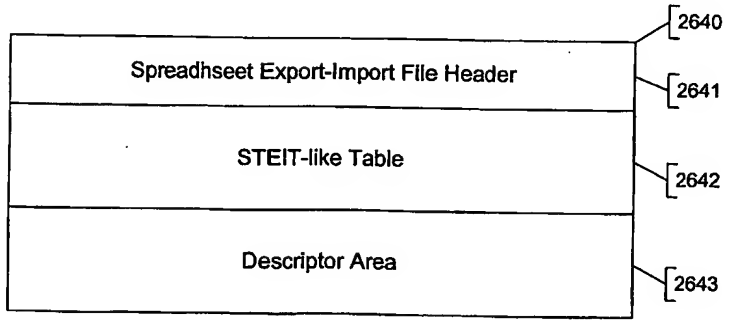


Fig. 27A

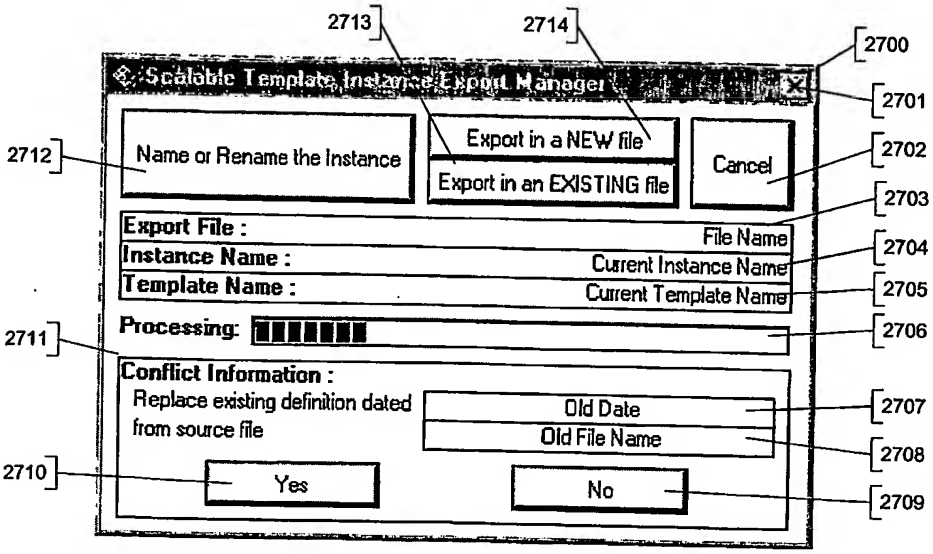


Fig. 27B

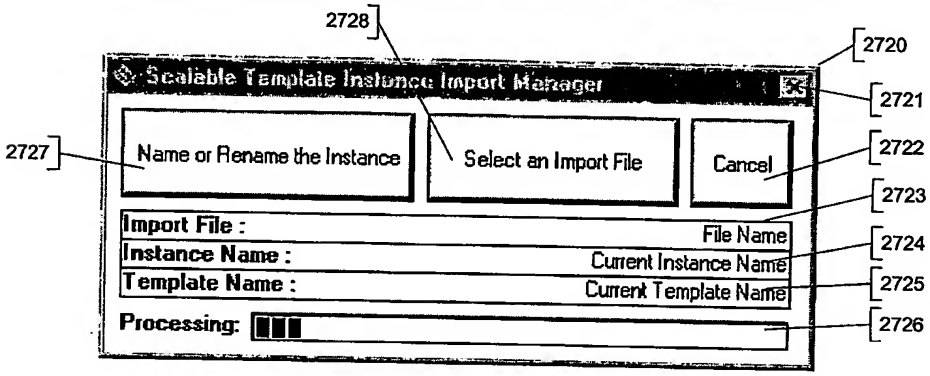


Fig. 27C

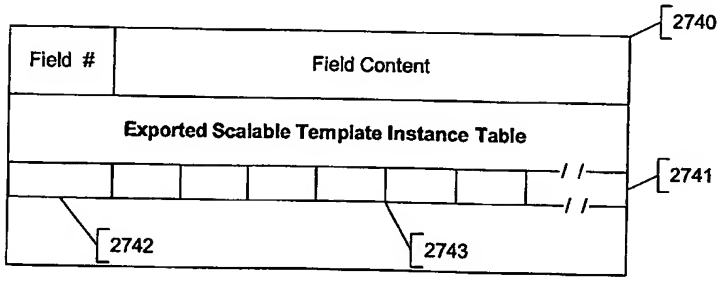
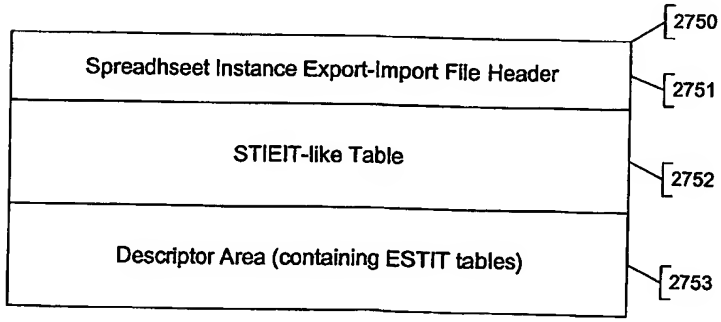


Fig. 27D



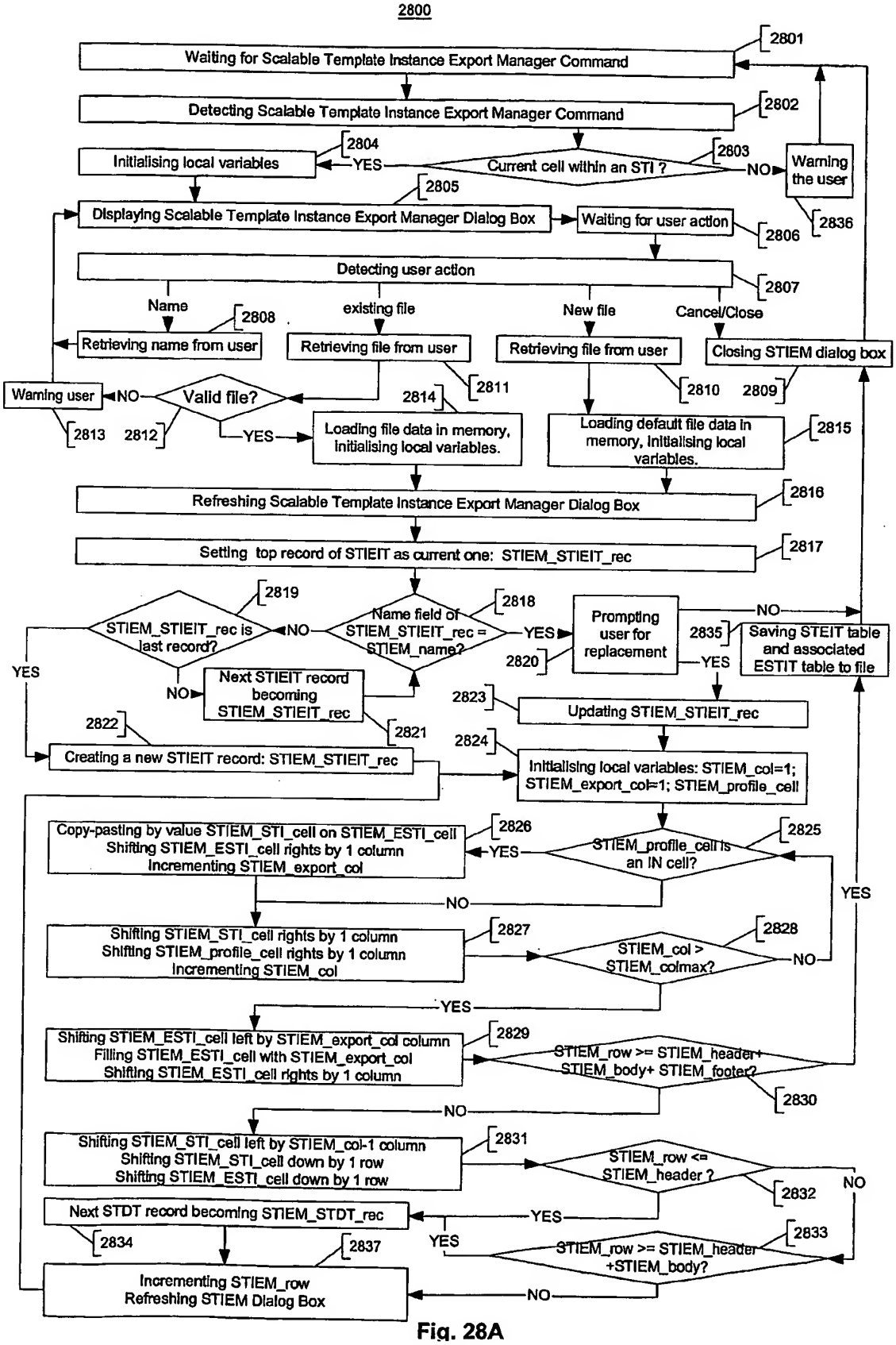

2800
2801
Waiting for Scalable Template Instance Export Manager Command
2802
Detecting Scalable Template Instance Export Manager Command
2804
Initialising local variables
YES
2803
Current cell within an STI ?
NO
Warning the user
2836
2805
Displaying Scalable Template Instance Export Manager Dialog Box
Waiting for user action
2806
Detecting user action
2807
Name
2808
existing file
New file
Cancel/Close
Retrieving name from user
Retrieving file from user
Retrieving file from user
Closing STIEM dialog box
2811
2810
2809
Warning user
NO
Valid file?
2814
2813
2812
YES
Loading file data in memory, initialising local variables.
Loading default file data in memory, initialising local variables.
2815
Refreshing Scalable Template Instance Export Manager Dialog Box
2816
Setting top record of STIEIT as current one: STIEM_STIEIT_rec
2817
2819
STIEM_STIEIT_rec is last record?
NO
2818
Name field of STIEM_STIEIT_rec = STIEM_name?
YES
Prompting user for replacement
2820
NO
2835
Saving STEIT table and associated ESTIT table to file
YES
YES
NO
Next STIEIT record becoming STIEM_STIEIT_rec
2821
2823
Updating STIEM_STIEIT_rec
2822
Creating a new STIEIT record: STIEM_STIEIT_rec
2824
Initialising local variables: STIEM_col=1; STIEM_export_col=1; STIEM_profile_cell
Copy-pasting by value STIEM_STI_cell on STIEM_ESTI_cell
Shifting STIEM_ESTI_cell rights by 1 column
Incrementing STIEM_export_col
2826
YES
STIEM_profile_cell is an IN cell?
2825
YES
NO
Shifting STIEM_STI_cell rights by 1 column
Shifting STIEM_profile_cell rights by 1 column
Incrementing STIEM_col
2827
STIEM_col > STIEM_colmax?
2828
NO
YES
Shifting STIEM_ESTI_cell left by STIEM_export_col column
Filling STIEM_ESTI_cell with STIEM_export_col
Shifting STIEM_ESTI_cell rights by 1 column
2829
STIEM_row >= STIEM_header+ STIEM_body+ STIEM_footer?
2830
NO
Shifting STIEM_STI_cell left by STIEM_col-1 column
Shifting STIEM_STI_cell down by 1 row
Shifting STIEM_ESTI_cell down by 1 row
2831
STIEM_row <= STIEM_header ?
2832
NO
Next STDT record becoming STIEM_STDT_rec
YES
2834
2837
YES
2833
STIEM_row >= STIEM_header +STIEM_body?
Incrementing STIEM_row
Refreshing STIEM Dialog Box
NO

Fig. 28A

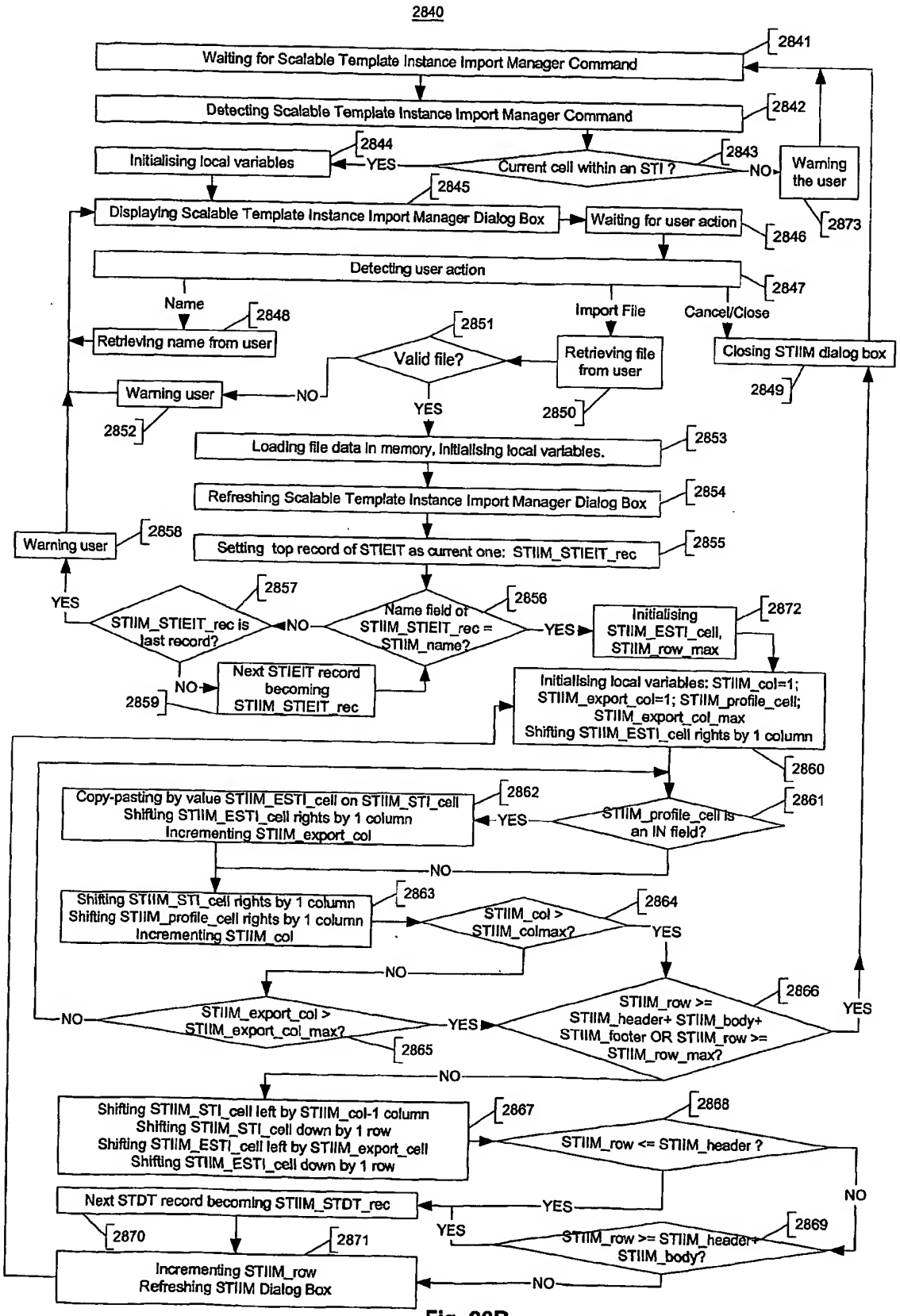

2840
Waiting for Scalable Template Instance Import Manager Command
2841
Detecting Scalable Template Instance Import Manager Command
2842
Initialising local variables
2844
YES
Current cell within an STI ?
2843
NO
Warning the user
2873
2845
Displaying Scalable Template Instance Import Manager Dialog Box
Waiting for user action
2846
Detecting user action
2847
Name
Import File
Cancel/Close
2848
Retrieving name from user
2851
Valid file?
Retrieving file from user
2850
Closing STIIM dialog box
2849
Warning user
NO
YES
2852
Loading file data in memory, initialising local variables.
2853
Refreshing Scalable Template Instance Import Manager Dialog Box
2854
Warning user
2858
Setting top record of STIEIT as current one: STIIM_STIEIT_rec
2855
YES
STIIM_STIEIT_rec is last record?
2857
NO
Name field of STIIM_STIEIT_rec = STIIM_name?
2856
YES
Initialising STIIM_ESTI_cell, STIIM_row_max
2872
NO
2859
Next STIEIT record becoming STIIM_STIEIT_rec
Initialising local variables: STIIM_col=1; STIIM_export_col=1; STIIM_profile_cell; STIIM_export_col_max
Shifting STIIM_ESTI_cell rights by 1 column
2860
Copy-pasting by value STIIM_ESTI_cell on STIIM_STI_cell
Shifting STIIM_ESTI_cell rights by 1 column
Incrementing STIIM_export_col
2862
YES
STIIM_profile_cell is an IN field?
2861
NO
Shifting STIIM_STI_cell rights by 1 column
Shifting STIIM_profile_cell rights by 1 column
Incrementing STIIM_col
2863
STIIM_col > STIIM_colmax?
2864
YES
NO
NO
STIIM_export_col > STIIM_export_col_max?
YES
2865
STIIM_row >= STIIM_header+ STIIM_body+ STIIM_footer OR STIIM_row >= STIIM_row_max?
2866
YES
NO
Shifting STIIM_STI_cell left by STIIM_col-1 column
Shifting STIIM_STI_cell down by 1 row
Shifting STIIM_ESTI_cell left by STIIM_export_cell
Shifting STIIM_ESTI_cell down by 1 row
2867
2868
STIIM_row <= STIIM_header ?
Next STDT record becoming STIIM_STDT_rec
YES
NO
2870
2871
YES
STIIM_row >= STIIM_header+ STIIM_body?
2869
Incrementing STIIM_row
Refreshing STIIM Dialog Box
NO

Fig. 28B

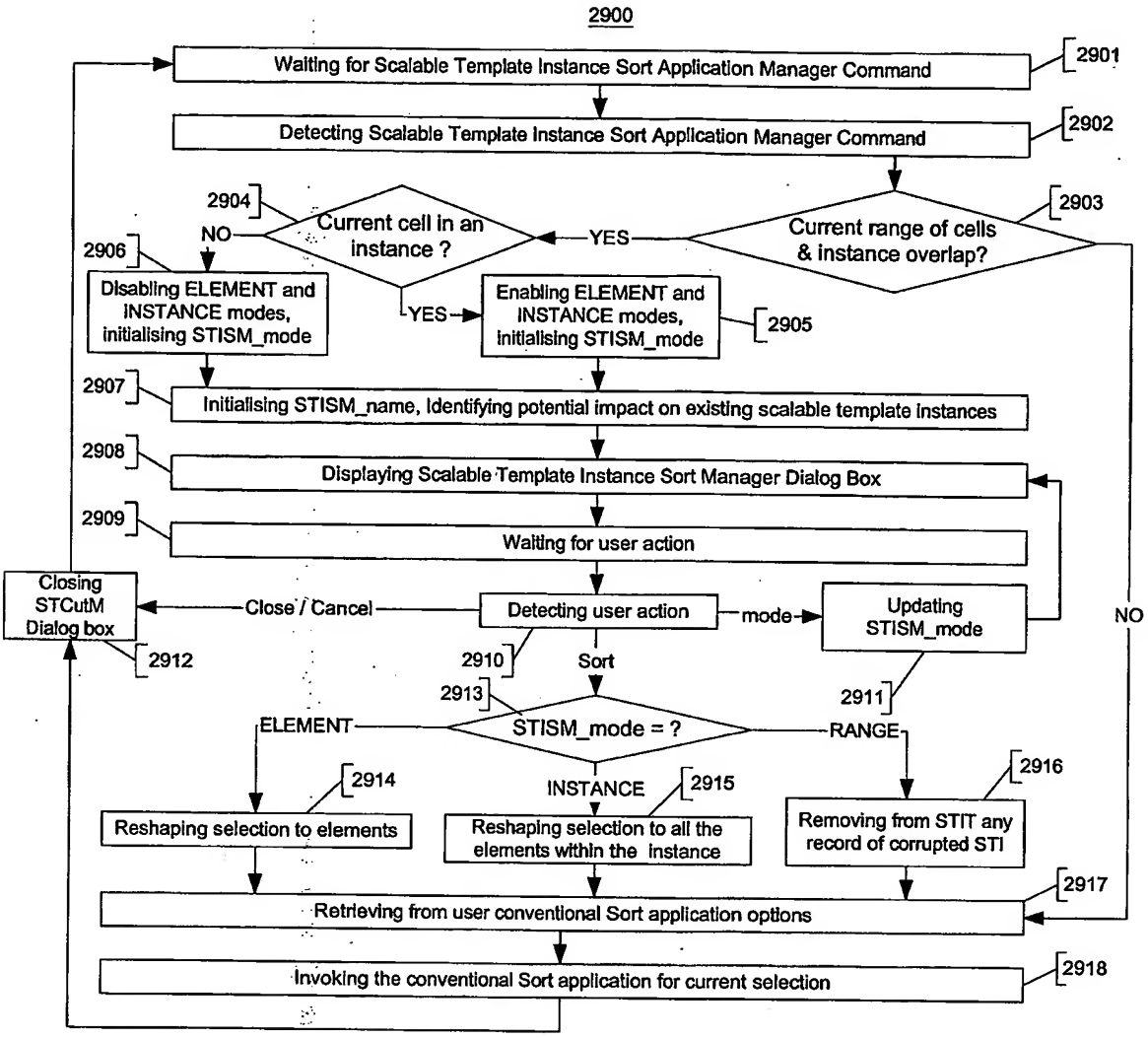


Fig. 29A

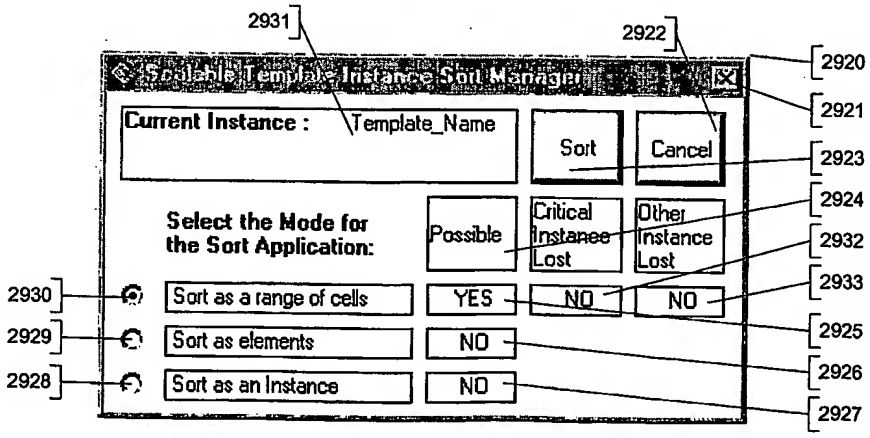


Fig. 29B

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